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MEDICAL

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COLLECTIVE ABSTRACTS

ORIGINAL ARTICLES

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INTERSTATE MEDICAL JOURNAL

CONTENTS.

Feb - 1919

CONTENTS.

EDITORIAL.

ORIGINAL ARTICLES.

DEPARTMENTS.

CONTENTS.

EDITORIAL.

ORIGINAL ARTICLES.

DEPARTMENTS.

EDITORIAL.

BLOOD CHEMISTRY—IS IT WORTH WHILE FOR THE CLINICIAN?

During the last few years, especially since the war has placed an embargo on criticism, the flood of publications describing methods and results of blood analyses has gradually been creeping higher and higher. The clinician now asks for a blood nonprotein nitrogen determination as light-heartedly as he demands a blood-pressure test.

Enough material has now accumulated to enable us to offer provisional answers to the questions:

1. Is there, from the purely clinical point of view, much to be gained from blood analyses?

2. If there is, what is it?

3. Is blood analyses the best means of obtaining the information we are after? If only so in parts, which are those parts?

4. What can be substituted with advantage?

So far as clinical applications are concerned, blood analyses deal with the determinations tabulated below. There are, of course, other determinations made by biochemists, but some of them, such as the calcium determinations, are more than suspect, judged by a standard of precision, while few of them are, or give promise of being, of clinical application.

BLOOD ANALYSES FOR CLINICAL PURPOSES.

I.

Nonprotein or residual nitrogen.
Urea nitrogen.
Uric acid nitrogen.
Creatinin nitrogen.

II.

Sugar.

<center>III.</center>

Hydrogen ion concentration.

Alkali reserve.

The determinations fall naturally into the three groups in which they are here presented.

<center>I.</center>

Nonprotein or Residual Nitrogen.—This is normally within 20 percent of double the urea nitrogen. This is also true of abnormal cases in general, except that in severe cases of nitrogen retention the proportion of urea nitrogen arises considerably. The comparatively rare instances to the contrary have never been shown to possess any diagnostic or prognostic significance, and can be explained in various ways. The simplest and most usual, when one is criticising other workers' results, is to attribute such variations to defective technic, personal or methodic. The truth is that all the technics so far suggested are, *pace* their authors, defective, and seriously so. The more exquisite precision of manipulation one brings to the task, the more does one realize this fact. Among other causes of error have been given the nitrogenous lipoids. The true cause is probably more fundamental, and is to be looked for among the absorptive phenomena of blood colloids. There is one source of fallacy, however, that should be eliminated. This is the variation in the ratio water income: water outgo. When this is properly adjusted, and the diet of the patient has been long enough under control, the ratio total nonprotein N : urea N will approximate $2\pm.4$: with entirely nonsignificant differences, except in the one case mentioned.

But it is in just such conditions that it becomes unnecessary to go through the elaborate and time-consuming operations of total nonprotein nitrogen determination. There are, in such circumstances, easier, more trustworthy methods to guide us.

Urea.—Setting this aside for the moment, however, let us examine the question of urea determination. Thanks to the introduction of the urease ferment methods and the refinements in its application to blood, it is now easy, when and if necessary, to obtain reasonably accurate, or at any rate consistent, results.

Seeing that the urea nitrogen value is as satisfactory an index of the residual nitrogen as the socalled quantitative results of the best methods for the direct determination for the latter value, and is a more satisfactory index of the degree of retention in severe cases, we are already prepared to say that the clinician is not justified in requiring from the biochemist the long and troublesome direct determination of the nonprotein nitrogen. If he blindly insists, he is getting no more information than is afforded by the more reliable urea value, and he risks getting a more fallacious result.

Our first conclusion is that *nonprotein nitrogen determinations serve no useful clinical purpose when the easier and more consistent urea determinations are available.*

Uric Acid.—These determinations by the colorimetric method seem sufficiently consistent and reliable. They are not troublesome, and can be made on small quantities of blood. Their clinical value is still very much open to question.

Creatinin.—It is interesting and not unedifying to note when one of our biochemical processes comes into the hands of professional analysts, owing to some purely commercial interest that it acquires, how untenderly it is treated by those hard-hearted technicians. This is the fate that is overtaking our creatinin determination methods.[1]

Fortunately the degree of accuracy demanded in blood chemistry for the determination of creatinin is only of that order referred to by the cynical gentleman who said that "a clinical test is one good enough to serve as a basis for a report to a clinician."

Our present methods, measured by this criterion, seem adequate. Nor are they difficult. They call for but little blood.

ARE THE NITROGEN DETERMINATIONS WORTH WHILE?

A rise in the total nonprotein nitrogen, or which has the same meaning—an increase in the urea nitrogen—is the first form in which deficient nitrogen excretion manifests itself. The next figure to rise is the uric acid nitrogen, and, last of all, the creatinin nitrogen.

But, if the nitrogen income is approximately known, and the urinary nitrogen outgo fairly accurately estimated, then the first pair of figures (the total nonprotein nitrogen and the urea nitrogen) may be dispensed with. They can tell us nothing that will not be at least as well told us by the urinary and clinical data taken with the N income: N outgo ratio. The latter figure is much more easily obtained, it involves no trouble to the patient; since only the urine need be examined, it is more accurate. There is only one point in which it causes a slight amount of extra work to the clinician— the calculation of the nitrogen income. But the physician who cannot or will not take the pains of making a simple dietetic calculation is not fit to have charge of a case in which the nitrogen output is of any importance. Such a person could certainly not make any use of blood analysis figures to the advantage of his patient.

There is, theoretically, one kind of case where hyperazotemia *per se* might be of clinical interest. I refer to endogenous hyper-

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[1]"In the author's laboratory several chemists have been unable to obtain consistent results by the method. . . . Cooperative work by the Association of Official Agricultural Chemists on the method gave results which varied in the extreme, and on the whole were of no value. . . . Grindley and others maintain that excellent results are obtainable by the method, but the author's experience does not confirm this." (W. D. Richardson in Allen's **Commercial Organic Analysis**, 4th ed., VIII, p. 411.)

azotemia, due to excessive nitrogen catabolism, coinciding with renal incompetency and not manifested by clear symptoms. In point of fact, except in acute fevers, such a condition is scarcely likely to happen—it is perhaps unthinkable. But if it occurred, we should not be unaware of its existence, since the urinary analysis, conscientiously conducted, would, even in this case, put us on our guard. Such a condition, assuming, for the sake of argument, that it could occur without being manifested by pathognomonic symptoms and by the results of urine analysis, would not be of much prognostic importance unless accompanied by creatinin retention.

The futility of blind analysis is well shown in a paper (intended to prove the contrary thesis) published in the Influenza number of *Paris médical*.[1] This article deals elaborately with the blood and urine ureas in a number of grippe cases. Blood urea increases with pulmonary complication; the increase is paralleled by excretion; to some extent it is a function of water intake. It is not a measure of the gravity of the disease. Fatal cases do not exhibit a more marked degree of azotemia than others. Indeed the authors report a reduction in the nitrogen accumulation before death. *Nothing is said about nitrogen intake.*

Here, manifestly, the rise of urea excretion, assuming that there was no great nitrogen intake, would have warned the clinician that there was high nitrogen catabolism taking place. That is all that the blood analyses showed. If he were further interested, then the blood and urine creatinin might have further enlightened him.

There is in all this something that reminds one of the use of the Wassermann reaction to the exclusion of older methods of syphilis diagnosis. And the Wassermann is many, many times more enlightening, as compared with those older methods, than the blood analyses are as compared with dietetic and uranalytic control.

Without the Wassermann, perhaps 50 percent of our control over syphilis is lost, without blood analyses perhaps 95 percent of our control over nitrogen metabolism and excretion is retained.

Let it be clearly understood that I am speaking of present clinical application and not of pathological research, and of its possible future utility.

Although the increase of blood uric acid does occur after the total nonprotein nitrogen rise, it is not of much prognostic value. It is far otherwise with creatinin. The evidence that has accumulated points to the prognostic gravity of any marked rise in the creatinin over the normal 2 milligrams per 100 c.c. of blood. When this figure rises to 5, 6, or more milligrams, the outlook is extremely grave.

While it has been shown that a very careful dietetic calculation

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[1]Gilbert, Chabrol et Drumont: Azotémie et grippe (Paris médical, Nov. 18, 1918).

and urinary analysis will detect the same condition of creatinin retention, and therefore of grave prognosis, the relations have not been reduced to simple formulæ, and, for the present, the clinician in grave cases is justified in asking for creatinin determinations in the blood.

Recapitulatory.—For the detection and estimation of nitrogen retention, *blood analysis serves at present no purpose that cannot as well or better be served by dietetic calculation and urinary analysis, collated with clinical observation,* except that, provisionally, *it is still, for prognostic purposes, justifiable to require creatinin estimations in the blood.*

Sugar.—There are several microchemical methods available for the estimation of sugar in blood. All of them are sufficiently accurate, or consistent, to enable us to detect hyperglycemia and to estimate approximately its degree.

Now, since hyperglycemia and the degree of hyperglycemia are important diagnostic signs and therapeutic indications, and as, further, there is no other means of detecting hyperglycemia than by estimation of the blood sugar, we cannot dispense with this operation. Epstein's micromethod, using only a few drops of blood, is sufficient for clinical purposes.

The Acidosis Group.—For the detection, determination, and study of acidosis a number of laboratory operations are available, some of which are made on the blood. Let us examine whether these blood examinations present such advantages as to be quasi-indispensable to the conscientious clinician. Or, to put the same thing in other words, is the physician who has not these methods at his disposal, but has others, seriously at a disadvantage?

The blood examinations which must be considered are:

Determination of hydrogen ion concentration.

Determination of alkali reserve.

The *hydrogen ion concentration* of the blood varies so little between the normal and the extreme of acidosis that it is rather of physiological than of clinical interest. The determination of this figure cannot compete with the other methods of studying the degree of acidosis.

The *direct determination of the alkali reserve* is an operation which is far from simple, and which requires quite an equipment of special instruments. On the other hand, there can be no doubt that it is the most satisfactory single criterion of acidosis throughout the range of this condition. But a double criterion, one part complementary to the other, one part satisfactory for slight to moderate, and the other part for moderate to severe degrees of acidosis respectively, is available which involves operations of a greater simplicity.

The two parts are (1) the index of acid excretion and (2) the

carbon dioxide tension of the alveolar air. The index of acid excretion depends on the arithmetic sum of the titratable acidity of the twenty-four-hour urine and of the ammonia excretion, both expressed decinormally (C), and on the weight of the patient (W). According to Fitz and Van Slyke it is possible to use these data, together with the volume of urine passed in twenty-four hours (V), to obtain, indirectly, the carbon dioxide capacity of the plasma (alkali reserve). Their formula is: plasma carbon dioxide capacity

$$= 80 - 5 \sqrt{\frac{VC}{W.}}$$

From normal to omderate severe acidosis this index of acid excretion is as good as the figure obtained by direct determination of the carbon dioxide capacity of the plasma. In the higher degrees of acidosis it is less accurate, but here the second part of our criterion, the determination of the carbon dioxide tension of the alveolar air, comes to our aid. This process is less simple than the determination of the index of acid excretion, but it is far simpler than the direct determination of the alkali reserve.

As to the alkali tolerance test, practiced by administering small quantities of sodium bicarbonate by the mouth until the urine reacts alkaline, this has little value and that little negative. It may prove the absence of acidosis, but neither the presence nor the degree of that condition can be satisfactorily determined thereby.

CONCLUSIONS.

Of the numerous blood analyses which it is now the fashion to make, the only ones which are indispensable and which cannot advantageously be replaced by simpler and less troublesome processes seem to be:

(1) The creatinin determination for prognosis in advanced nephritis.

(2) Sugar determinations.

(3) Possibly, though not certainly, uric acid determinations.

COLLECTIVE ABSTRACTS

WAR SURGERY OF THE KNEE.

By ARCHER O'REILLY, M.D., F.A.C.S., of the Editorial Staff.

During the present war, surgery of the knee has been one of the most important problems. Its treatment has offered many problems, probably the most serious of which is the great liability to infection and the difficulty in treating this condition. The knee-joint is more frequently wounded than any other joint in the body. Delorme says that this type comprises one-third of all joint wounds and 3 percent of all wounds.[1]

The treatment of knee wounds has passed through several periods since the beginning of the war. Lee[2] says that the treatment of joint wounds as carried out at LaPanne can be divided into four separate periods:

"First period, to September, 1915: Excision of tissues, drainage, antiseptic irrigations (HO formol or carbolic acid), immobilization.

"Second period, to July, 1916: Excision, Carrel-Dakin treatment in the joint; immobilization.

"Third period, to July, 1917: Excision, lavage of the joint with Carrel or ether; immediate joint suture, allowing, however, for drainage of the joint for twenty four hours; immobilization; passive movement and massage in eight to ten days.

"Fourth period, July, 1917, to the present: Excision, irrigation with saline and ether; immediate joint suture; immediate active mobilization."

In practically all the hospitals these periods of treatment hold true except the fourth, in which immediate active mobilization is employed.

Emerson[3] classifies the types of injury roughly into two groups:

    (a) Bullet wounds.

    (b) Shell fragment wounds.

"Among bullet wounds are included those caused by rifle and machine gun fire and shrapnel ball. The wound of entrance is very small, often barely more than admitting a probe. The exit wound is a trifle larger. Both are clean, punched holes, and there is little evidence of disturbance in deeper structures through which the missile has passed. Curiously enough, the wound made by the much larger shrapnel ball often resembles the bullet wound, there being but little more laceration in spite of the difference in size. In the case of either type of ball the smoothness of the missile is the explanation of its relative harmlessness, and because it causes little tissue tearing and does not so readily carry dirt and shreds of septic clothing into the wound.

"The fragment type of wound is caused by larger or smaller bits of bomb, shrapnel, or high explosive casing. The very small fragments may penetrate in a manner resembling the bullet, but in the great number of cases some injury to skin and underlying tissue is the rule. Just after leaving the muzzle the course of the steel-jacketed, cone-shaped rifle bullet is not quite steady, and the injuries inflicted by it at short range resemble those tearing wounds caused by irregular fragments.

In the shell fragment wounds the entrance wound is torn, jagged, and bruised. Extraordinary quantities of mud and clothing may be carried in

and deposited along the widely lacerated track. The exit wound may tear away large areas of skin and carry out the shredded ends of muscle, tendon, and fascia. Even in the smaller wounds, where less damage is visible externally, it will be found that the laceration of soft parts is far more extensive than appearance indicates, and always much greater than in the case of typical bullet wounds. The same contrast holds true in nonperforating wounds where there is but one wound of entrance."

The wounds, whether caused by bullet or shell fragment, may be classified as follows: .

"A. Wounds involving the capsule of the knee-joint without fracture.
"B. Wounds involving the capsule with fracture of one or more of the bones entering into the structure of the joint.
"C. Wounds of the bones of the joint, causing fractures into the joint, but not involving the capsule."
1. Through and through wounds, with no foreign body in the joint.
2. Wounds with foreign body in the joint, free or imbedded in bone or capsule.
3. Wounds with foreign body passing through the capsule and lodging in bone or soft parts, but quite outside the joint itself.

There have been many divergent views as to the method of treatment of these joint injuries, but one fundamental principle has emerged which has been agreed to by all. "This principle rules all war surgery, and is early intervention, with removal of the infecting projectile and other foreign bodies.[1] As to the extent of primary intervention, individual views vary considerably, but the early conservatism followed by reactionary radicalism, involving the sacrifice of too much bone, has been succeeded by a rational, scientific, and efficient line of treatment. The sooner operation follows injury, the better the result.[3]

"In those cases in which there is a simple penetrating wound caused by a bullet, with no bone injury and in which there is no or only a slight effusion, splinting and rest is often sufficient. If infection develops, immediate operative interference is necessary.[3] Judd[1] believes that they are best treated by evacuating the contents by puncture, compression, and immobilization. Where there are slight bony lesions caused by a ball which has traversed the joint, the same treatment should be employed. The injection of a 2-percent formalin glycerine solution has been used, but is not generally employed. In these cases Cumston[4] advises that where there is no fever, if the swelling has not become absorbed in a few days, the joint should be emptied, but an aspirating needle should never be used. If there is pyrexia, arthrotomy should immediately be undertaken. The joint should be irrigated once or twice a day with salt solution or a mild antiseptic solution, and then sprayed with ether. As soon as the fever has subsided and the wound has taken on a red look, the irrigation should be discontinued and a dry sterile dressing applied every two or three days, according to the amount of discharge."

Fluoroscopic examinations should be made in all cases and the extent of the injury should be determined, and all foreign bodies should be localized. These must be removed immediately by arthrotomy.

"The joint must be opened and all foreign bodies bullets, shell fragments, clothes, loose pieces of bone and cartilage must be removed."

Duval calls the method the "laparotomy of the knee," and describes the operation as follows:[1]

"1. The knee-joint is widely opened by a U-shaped incision, dividing the ligamentum patellae.

"2. The blood clots are evacuated and the synovial cavity is flushed out with ether.

"3. The projectiles, loose cartilaginous and bony fractures are removed, and the bony cavities are curetted.

"4. The margins of the perforations of the synovia are excised and then sutured with catgut.

"5. The joint is completely closed, without drainage, by a two-layer suture.

"6. The edges of the wounds of exit and entrance are excised down to the synovia and then sutured."

A number of surgeons believe that the U-shaped incision, with division of the ligamentum patellae, is too radical. Moynihan[5] suggests enlarging the wound of entrance by a lateral incision of incisions or by the U-flap. Barnsby[6] strongly advises a unilateral arthrotomy.

The x-ray shows the position of the projectile and indicates the site of the incision, which should be at least 1 cm. behind the patella and 4 or 5 cm. long, which allows exploration and removal of foreign bodies. The knee should be in flexion. If an important condylar lesion is found, the incision can be enlarged and sufficient light obtained by using retractors. If there is a bicondylar lesion, a U-shaped incision is best. The joint is flushed with ether and is closed by primary suture in three planes without drainage. Mobilization is commenced as soon as the sutures are removed. The contra-indications for the lateral arthrotomy are: (1) important lesions of the tibial articular surface; (2) total comminutive fractures of the patella; (3) fractures in which an included projectile cannot be extracted by the lateral opening. In these cases the larger arthrotomy is indicated.

Some of the writers believe in temporary drainage. Moynihan[5] suggests leaving a gap in the synovial membrane, or by the use of a drain which is inserted into the synovial membrane, but never into the joint.

Most of the authors advise immobilization after the operation for a period of from ten to twenty days. This is secured by a posterior splint, by a Thomas knee-splint with moderate traction, or by a plaster of paris bandage, with windows reinforced by a metal bridge to allow dressing. Lee,[2] however, describes a method of treatment at Depage's hospital at LaPanne as follows:

"Active mobilization of the joint is begun the following day and continued three or four times daily, and at least once during the night, for the next few days. With lower extremity cases, walking is begun, if possible, the day after operation and continued with increasing frequency day by day. Crutch support is allowed the first day, then a cane is substituted, and shortly this is also discarded."

Passive motion should never be used, as traumatism may be done to the joint. The patient complains a good deal for the first two or three days of active movement, but after that time he is reasonably comfortable.

"Active mobilization is even used in certain cases complicated by joint fracture, with apparently good results. If there has been a considerable loss of muscle tissue overlying a considerable body lesion, immediate mobilization should be deferred from five to six days. With extensive bony injury of the knee the period of rest and immobilization should be prolonged for several days, and active movements should not be begun for a week or ten days. Active mobilization is employed even in acute purulent arthritis, on the theory that the joint will drain itself if active movements are faithfully persisted in. Even though the patient is quite ill, with high temperature, the routine of joint motion is conscientiously carried out. The patient is induced to make active motions every hour or two during the day, and is wakened two or three times during the night for the same purpose. The course may be long

and tedious, but the results obtained at LaPanne seem to justify the procedure."

In patellar fractures[1] loose fragments should be removed as much subperiosteally as possible. If there is a fair prospect of aseptic healing, large fragments may be brought together by a catgut periosteal suture. In cases of extensive comminution the entire patella may be removed subperiosteally. The loss of the patella, provided the healing of the wound progresses favorably, does not necessarily prevent a good functional result. Where the patella is removed, a plastic operation for synovial closure can be done by utilizing the supra patellar pouch.[3]

If sepsis develops, either as a result of unavoidable delay in treating the injury or following primary suture, three procedures may be followed: the joint may be opened and drained, it may be resected, or the leg be amputated.

In a certain number of cases[3] the knee may be opened, freely washed out and sutured, often with success. In many cases this is not sufficient and then drainage may be attempted. This, at best, is a difficult procedure owing to the complicated structure of the joint. Emerson believes that no good will come from anterior drainage of the knee. Posterior drainage of the knee is mutilating, and an operation of magnitude. For its proper performance both heads of the gastrocnemius should be severed freely and the capsule opened widely at its most dependent part behind each condyle. Carrel tubes, not less than six, should be introduced so as to flush completely every part of the synovial surface. The leg should be on a Thomas splint, with fair amount of extension both for immobility and to separate the joint surfaces, and to facilitate washing. Eusol should be used freely, either by continuous drip or at frequent intervals, avoiding much distention of the capsule.

At LaPanne[2] the knee is opened laterally. No drainage material is used, as it prevents drainage and carries infection into the joint. No irrigations are used, as they may introduce infection. Hot dressings are applied for the first forty-eight to seventy-two hours, changed every two or three hours if very considerable joint swelling and local reaction follow the operation. Active movement of the joint from the very beginning.

Judd[1] states that the classical arthrotomy by incisions on each side of the patella have been modified in various ways:

1. By a horseshoe incision dividing the ligamentum patellæ and laying back a flap in which the patella is included.

2. The arthrotomy of Ollier. This comprises—in addition to two lateral incisions, one on each side of the patella—two posterolateral incisions anterior to the hamstring tendons. Drains are passed through the two incisions on the same side. A fifth incision through the popliteal space may be added.

3. Chaput recommends removal of the patella.

4. Fieux opens the cul-de-sac by a crucial incision, and turns back the corners of the flap and holds them in place by sutures.

5. Delbet has suggested complete section of the lateral ligaments, which, with continuous traction, opens up the joint and allows drainage.

6. Jaboulay splits the cul-de-sac and elevates the limb to an angle of 45 degrees.

7. At the Juilly Hospital of the American Ambulance the following method was practiced with satisfactory results:

The patella, ligament, and cul-de-sac were divided in the median line from the tibial tubercle to the upper limits of the cul-de-sac. Lateral accessory incisions were made and drainage tubes inserted on each side. The two halves of the patella were held apart by short pieces of wire. The thigh and lower leg were then encased in plaster of paris, the knee area bridged over by metal bands or meshes of wire, the ends of which were incorporated in the circular

plaster splints above and below the knee. The patient was kept on his abdomen a good part of the twenty-four hours, and by this dependent position and the wide incision free drainage was maintained. The two halves of the patella were allowed to come together as improvement progressed and finally healed solidly. The result was firm ankylosis without impairment of the quadriceps."

Saline solution, peroxide of hydrogen, formaldehyde, carbolic, sublimate, chloride of magnesium, and Dakin's solution are used to irrigate the joint. Dakin's solution is becoming more and more favored.

In the early periods of the war excision was frequently practiced as a prophylactic measure against infection, but in the later period arthrotomy has been largely used, and most surgeons use it only in those cases in which infection has developed or in those cases in which an arthrotomy will not give the patient a useful leg. Excision should be immediately done in cases with severe comminution of the articular ends with much loss of substance.[5]

Emerson[3] states that a disappointing class of cases is those involving the tibia. Perhaps due to its somewhat more compact structure, comminution seems to be more extensive. Infection is more prone to occur, and the difficulties in getting a tight capsule are greater where considerable bone is removed. Mild cases may justify conservatism, but, where other bones are involved as well, severe tibial injury points toward resection.

Cumston[4] is not in favor of arthrotomy, and believes that in those cases in which it has given good results the injury was confined to the synovia and that there was no injury to the articular surface. In the cases with bone lesions he advises primary subperiosteal excision. The time of operation is important, and says that it should be done within the first three or four days. If done ten or twenty days after injury or after an arthrotomy, it should be classed as a late resection. In these cases the results are usually bad.

Nove-Josserand[7] believes that the recovery of a movable and easily functioning joint after a knee injury is exceptional, and that in the great majority of cases the amount of mobility retained is more or less of a disadvantage, because it diminishes the solidity of the limb and interferes with walking without being sufficient to obviate the disadvantages of a stiff knee. In many cases ankylosis is preferable, and the more complete it is the better the function. If a movable joint is desired, it can better be obtained at a later operation. He believes that nonunion is due in some cases to an interposition between the bone surfaces of a thick layer of fibrous tissue, due probably to defective coaptation. After resection the weight of the lower leg has a tendency to separate the articular surfaces, and sutures made in the friable spongy tissue cannot always prevent this. The author suggests that the leg be kept in a vertical position, so that its weight would prevent this.

Judd[1] outlines the generally accepted method of resection:

"The incision usually employed is the curved horseshoe incision or the H-shaped incision. The joint is opened, the clots evacuated, and the periosteum stripped back. The patella is considered more harmful than useful, and is usually removed, preserving as much of the periosteum as possible. The synovial membrane is dissected out with forceps and scissors. The bony section is then made with the saw. This section may cross some fissures, but no trouble from them need be apprehended. The femur and tibia may be held together with metallic sutures, but these are not necessary. Drainage is provided, and the quadruceps tendon and capsule carefully sutured.

"Immobilization is secured by a posterior plaster gutter splint, extending from the groin and including the foot. A posterior wooden splint with a footpiece may be employed. If a plaster cast with bridges of metal is used, a

small posterior splint must be added to maintain the bony position and prevent posterior displacement of the tibia.

"The classical resection is generally recommended. In order to preserve as much of the length of the limb as possible in cases where the lesion is limited to the femur, the section of the tibia may be limited to the removal of the layer of cartilage to the depth of a centimeter and barely touching the bony tissue. Some attempts at partial resection have been made, but the orthopedic results are usually poor, as removal of one condyle causes subsequent deviation of the limb. Hemiresection is not regarded favorably. The apposition of a raw bony surface to an intact cartilage produces ankylosis only when the cartilage has disappeared as a result of inflammation. In cases of destruction of the lower extremity of the femur and the end of the bone projects as a point, this point has been successfully implanted into a niche hollowed out of the tibial surface.

"The procedure of keeping apart the bones by extension, in order to create a cavity, is considered a mistake. The raw bony surfaces, bathed in pus, offer a surface for septic absorption, the spongy tissue becomes infected, and, if septicemia is escaped, union is compromised.

"Bad results occur when the bony surfaces have not been kept in good apposition and improper alignment has resulted; when the operation has not been done subperiosteally and no union results; when the extent of the femur removed makes union impossible; when the operation is done too late or for too extensive lesions and amputation is indicated."

Osgood[8] deplores the tendency to remove all loose fragments of bone, and even excise neatly one or both of the damaged articular ends. It had been conclusively demonstrated, in compound septic gunshot fractures of the shafts of bones, that the removal of loose, even completely detached, portions of bones is in most cases bad treatment.

It is quite impossible to recognize in such wounds shreds of osteogenetic periosteum. Nearly all the comminuted fractures in which sepsis can be overcome, and in which the bone fragments are allowed to remain in situ, eventually gain solid union, while the next removal of the loose fragments and the clean excision of the bone ends result in far too many of the cases in nonunion.

Osgood believes that after septic compound joint fractures, ankylosis is the most desirable result, and that it is most important that the ankylosis should result with the leg in the most favorable position. Sir Robert Jones believes that for the knee this position is in extension. Bracket and others, on the other hand, believe that it should be in from 20 to 30 degrees flexion.

"In the presence of sepsis, excision of the knee reaches every recess of the joint and allows free drainage, an end not always possible to obtain in any other nonmutilating method. It is difficult, though not impossible, to fasten the bone ends together by suture or the wire staple which Tuffier uses in septic excisions. If this is not done, it is extremely hard to immobilize the limb. The few results which he has seen of excision of the knee in the presence of sepsis have not been encouraging."

Amputation is an operation of last resort, and may be primary or secondary. Cumston[4] believes that amputation should be avoided where possible, but states that it is absolutely and unquestionably indicated: (1) when there is crushing of the knee-joint or when the surrounding soft structures and bones forming the joint are so destroyed that they cannot be saved; (2) when there is a wound of the knee with injury to the large vessels of the popliteal space, but ligature may first be done, if this is possible, and an attempt made to preserve the limb, although generally the result will be unsuccessful; (3) immediate amputation must be done when there is gangrene or when a purulent arthritis is complicated by secondary hemorrhage from the popliteal artery, as occasionally

happens. He always performs a circular amputation as low down on the thigh as possible and never sutures the stump.

"Judd[1] states that secondary amputation is indicated where arthrotomy or resection has failed to arrest the progress of infection. This septic condition manifests itself by the bad general condition of the patient, elevation of temperature, with irregular oscillations, albuminuria, septic vomiting, or diarrhea. Local manifestations of an unfavorable character are edema of the ankle of the sound leg, pitting on pressure of the affected thigh, abscess formation in the thigh, secondary hemorrhages, metastatic infection of the ankle-joint, or a rapid involvement of the entire limb by a gas gangrene or mixed infection."

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ORIGINAL ARTICLES.

CLINICAL ASPECTS OF THE INFLUENZA PNEUMONIA PANDEMIC.*

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Although data may be incomplete and conclusions only tentative, it seems of value to review our experiences now in the influenza pandemic. I shall confine myself to the pneumonias as I have found them, with their occasional perplexing symptoms and peculiar manifestations and physical signs. It should be prefaced that in no case was the sputum examined for the type of invading organism, as the cases were seen chiefly in consultation, but from the phenomena present it seemed highly probable that the great majority belonged to the prevalent influenza epidemic.

It will perhaps be advantageous to study and group cases from the combined standpoint of physical signs and severity. Despite the fact that there must necessarily be some overlapping, that groups may merge, or that patients starting in one group may eventually be placed in another, I believe that a classification such as outlined is of value because it gives a clearer insight into prognosis and therapy. Necropsy would probably have shown one or more smaller pneumonic areas than those diagnosable by our methods of physical examination, but as clinicians we are chiefly concerned with the physical data within our reach.

I shall give several case histories in each group, and then reserve for comment such aspects of the pneumonia pandemic which have particularly impressed me.

GROUP I. LOBULAR PNEUMONIA.

(A) SINGLE INVOLVEMENT.

I use the term lobular pneumonia to denote small areas of pneumonic consolidation. I prefer it to the term bronchopneumonia by which some pathologists include the production of interstitial tissue, an infrequent pathological change in the present pandemic.

CASE I. B. F., female, aged 19, had slight pharyngitis, epistaxis, dry cough, and a temperature of 101°. For two days physical examination showed slight bronchitis. The temperature became normal after two days. There was then a

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*Read in part before the Yorkville Medical Society, Dec. 16, 1918.

sudden rise of temperature to 104°; there was no chill. A small area of lobular pneumonia at the left scapular angle then appeared. The physical signs were localized crepitant rales, and distant bronchovesicular breathing. The area did not spread; the patient recovered after several days.

CASE II. H. M., dentist, aged 28, a man of powerful physique, complained of lassitude and headache for one week. Three days ago he had irregular chills, fever ranging from 102° to 104°, and slight expectoration. Examination revealed a small area of pneumonia at the angle of the right scapula. The physical signs were localized moist rales and distant bronchovesicular breathing.

CASE III. Mrs. M., aged 47, a strong, vigorous woman, had cough, fever, and expectoration for three days. Examination revealed a small area of lobular pneumonia at the angle of right scapula.

CASE IV. M. K., male, aged 26, developed a palatopharyngitis with slight temperature four days ago. Two days ago his temperature rose to 104°. On examination the lateral pharyngeal wall was sensitive to deep pressure; the physical signs in the lung consisted of a small localized patch of dry, leathery rales in the right midaxilla; there were no rales elsewhere. The diagnosis of a small lobular pneumonia was made.

CASE V. M. W., male, aged 33, has been sick for three days with temperature varying from 101° to 103°. The physical signs consisted of dry, leathery superficial rales at the end of deep inspiration and coughing, and of distant bronchovesicular breathing. A few days later he developed similar signs on the other side. At no time did he feel or appear ill. He recovered without complications.

CASE VI. F. S., male, aged 34, had a slight rhinitis two days ago; three days thereafter he vomited, had a temperature of 101° and a dry cough. He did not feel ill. Physical examination revealed a few localized dry rales at the right base posteriorly. There was no difference in the breathing or voice sounds.

CASE VII. J. T., aged 21, a vigorous boy, had been ill about one week ago; the symptoms then were lassitude and headache. He developed slight labial herpes. Two days ago he complained of severe headache and had a slight chill. The temperature was 103°; there was a slight harsh cough. Physical examination of the chest was then negative. The next day the fever was 104°; physical signs of pneumonia were still absent. On the third day he had profuse perspiration and normal temperature. For the first time a few crepitant rales were heard at the left base. Twenty-four hours later there was, in addition, distant bronchovesicular breathing.

CASE VIII. M. E., aged 28, had pharyngitis followed by otitis media and a serosanguineous ear discharge one week ago. Two days later he developed a temperature of 103°. Examination revealed a small localized area of pneumonia with typical physical signs.

CASE IX. H. B., male, aged 17, had a slight bronchitis a few days ago. He then developed a temperature of 103° and mucosanguinolent expectoration. Examination showed typical signs of a lobular pneumonia at the left base posteriorly; there was also slight generalized bronchitis. The process remained localized; the temperature became normal in three days.

CASE X. M. L., male, aged 21, had had rhinitis for a few days antedating his present illness. The latter began with a temperature of 103° and muco-purulent expectoration. He presented typical signs of a left-sided lobular pneumonia. The next day the physical signs were much less marked. He made a rapid recovery.

CASE XI. M. R., female, aged 28, had pharyngitis three days ago. Two days thereafter she vomited, had blood-tinged expectoration, and a temperature

of 103°. There was a small area of distant bronchovesicular breathing and a few crackling rales at the left scapular angle. The next day more typical signs of a lobular pneumonia developed.

Case XII. M. S., male, aged 38, had a temperature of 103°, cough, and slight mucosanguineous expectoration. There were a few localized crepitant rales at the right base anteriorly and distant bronchovesicular breathing over the same area. The physical signs cleared up in a few days.

Case XIII. S. T., female, aged 6, had had fever and cough for four days. There were definite physical signs of a lobular pneumonia at the right apex— mucous rales and bronchovesicular breathing. The child convalesced in a few days, and the physical signs of pneumonia entirely disappeared.

Case XIV. A. W., female, aged 36, had trachitis, with a temperature of 101°. Two days later the temperature was 103°, with definite signs of a lobular pneumonia at the left base posteriorly.

Case XV. M. Z., female, aged 45, developed a rather extensive influenza bronchitis; two days thereafter her temperature was 104°; there were beginning signs of lobular pneumonia. These later developed more clearly, although the signs were never typical. The fever and pneumonic signs disappeared in one week.

Case XVI. P. G., male, aged 17, a stalwart boy, had slight rhinitis three days ago. He then developed a temperature of 103°, and cough with sanguineous expectoration. Examination revealed an area of lobular pneumonia at the left base, with typical physical signs—moist rales, distant bronchovesicular breathing, and exaggerated voice sounds.

(B) TWO OR MORE LOBULAR INVOLVEMENTS.

Case XVII. E. L., female, aged 26, became ill with a mild influenzal pharyngitis. The next day there was an added rhinitis, with an increase in temperature. Two days thereafter there was bronchitis and a temperature of 102°. The following day, five days after the beginning of her illness, there was a rise of temperature to 105°. Physical signs of a lobular pneumonia did not develop until two days later; there was then definite patchy lobular involvement in both bases; the left-sided involvement spread laterally to the axilla. This case is an exquisite example of the descending character of the infection, involving as it did the nose, nasopharynx, large bronchi, and finally the lungs. The patient was in bed from the very beginning of her illness, and under constant and careful medical supervision. She recovered after a week's sharp illnss.

Case XVIII. M. D., male, aged 40, had run through a fairly severe febrile course of a right-sided lobular pneumonia. He then developed left-sided pleuritic pains, with a temperature of 103°. Examination showed a resolving right-sided and a beginning left-sided lobular pneumonia. He made an uneventful recovery.

Case XIX. M. L., female, aged 36, had been sick for one week with fever and cough; the fever ranged from 101 to 104°. There were the mucous rales of a capillary bronchitis to be heard over the entire chest; in addition, there were physical signs of a lobular pneumonia at the right base posteriorly. The temperature fell by lysis, and the patient felt quite comfortable for two days. She then developed pain in the right lower side of the chest and a feeling of suffocation, which she referred to the same area. The temperature, which had been normal, rose to 101°, the pulse rate to 110 per minute, the patient was quite dyspneic, her lips slightly cyanotic. Over the right lower lobe posteriorly there was an area of distant bronchovesicular breathing, a few rales, and some dullness. At the extreme base of the same lobe there was entire absence of breathing. Over the right lower lobe anteriorly there

was distant bronchovesicular breathing, slight dullness, and localized mucous rales. The diagnosis of incomplete resolution of a posterior lobular pneumonia, with reinfection of the anterior part of the same lobe, was made. Absence of breathing at the extreme base posteriorly was assumed to be due to atelectasis. The patient was quite ill for four days, the temperature rose to 103°, the heart rate to 140 per minute. The next day there was a critical drop of temperature, with profuse respiration; the dyspnea disappeared. With the crisis the patient developed a cardiac arrythmia. Its nature was not sufficiently typical to be diagnosed without polygraphic tracings, but clinically it seemed due to a marked sinus arrythmia, perhaps even sinoauricular block. In the absence of evidence of cardiac disease or of cardiac symptoms, the arrythmia was regarded as of nonorganic origin, and probably due to the crisis. However, since large doses of digitalis had also been given, digitalization as a factor could not be entirely disregarded. The further course of the case was interesting. The temperature remained normal one week; it then rose to 103. This was found to be due to an incomplete lobular involvement at the right apex. The temperature again became normal after two days. It remained so for one week. There were then irregular daily rises of temperature to 104° every evening; temperature was normal in the morning. Physical signs indicating an interlobular empyema developed, although puncture did not reveal pus. She finally coughed up some pus for a few days. After that, convalescence was uninterrupted.

CASE XX. L. L., aged 19, a powerfully built boy, had had chills and slight pharyngitis two days ago. He then developed a temperature of 104° and slight cough. Except for thirst and slight malaise due to fever, he did not feel ill. There were typical signs of a lobular pneumonia at the right base posteriorly. He defervesced after three days. After twenty-four hours there was a rise of temperature to 103° and a fresh area of lobular pneumonia at the left midaxillary region. Thereafter convalescence was uneventful.

The patients with single lobular involvements (Group I—A) were characterized by their benign course and by the variability of the physical signs. Only exceptionally was the pulse rate more than 90 per minute. There was no dyspnea, the respiration was normal or only slightly increased in rapidity. There was no cyanosis. In fact, the patients resembled the usual course of a mild bronchopneumonia seen in other epidemics. Most interest centered in the obscure physical signs, varying from localized soft, mucous, or dry rales to the typical physical signs of a lobular pneumonia. The characteristic of the atypical cases was the localized character of the rales. Often they were heard only after forced respiration or coughing. It would ordinarily be precarious to diagnose pneumonia from a few rales; but the onset and clinical course of these cases, and the fact that some of these same patients later developed typical pneumonic signs over the area of localized rales, leaves little doubt that they were actual pulmonary involvements. Consolidation, however, was apparently incomplete or patchy; the *rale redux* was rarely present. Critical sweats were prominent features of the defervescence even when the latter was lytic in character. Sweats often continued for a week after the temperature was normal.

Patients with more than one lobular involved (Group I—B) usu-

ally developed higher temperature and were sicker than those with single involvements. Some of these cases may well have shown at postmortem incomplete consolidation of an entire lobe, although the physical signs indicated only lobular involvement. In only one case (Case XIX) was the patient's life in any danger. As a rule, the course of the multiple lobular cases was benign, the outcome favorable. The lobular pneumonias were not confluent; diffuse capillary bronchitis and cyanosis were infrequent. The patients were ill . mainly as the result of the incidental fever and cough.

GROUP II. LOBAR PNEUMONIA.

(A) GRADUAL DEVELOPMENT.

Besides the comparatively slow spread of the inflammation in the lung, these cases were characterized by absence of cyanosis and of diffuse capillary bronchitis. The patients were sicker than the lobular group (Group I) and the disease usually lasted longer. When resolution was slow, the outcome was favorable, whether the patient had a single or double involvement. The patients might be classed as the seriously, but not dangerously, sick group.

CASE XXI. B. B., physician, aged 28, first had influenza pharyngitis, with a temperature of 103°, and severe backache. The temperature reached normal the next day. Three days thereafter he developed what at first appeared to be a lobular left-sided pneumonia; the temperature ranged between 103° and 105°. During the succeeding two days the entire lobe became involved, but there never was the flatness nor tubular breathing characteristic of complete consolidation. The expectoration was scanty, the rales were dry and crepitant in character. Consolidation was apparently incomplete. The infection in the left lobe lasted one week; there was then a pseudocrisis. With a rise of temperature the next day there was similar slow involvement of the lower right lobe. The patient made a good recovery.

CASE XXII. M. F., aged 28, a stockily built man, had been sick one week. The symptoms were cough, high fever, left-sided pain, and bloody expectoration. The physical signs were those of a left-sided lobar pneumonia; daily examination showed there had been a gradual spread of the present process until it had reached its present size. The rales were partly dry, partly mucous. There was little capillary bronchitis; there was no cyanosis or dyspnea. The patient convalesced in a few days.

(B) RAPID DEVELOPMENT, WITH AND WITHOUT CYANOSIS AND CAPILLARY BRONCHITIS.

CASE XXIII. L. A., male, aged 40, had been sick ten days with fever, cough, and delirium; he also had had nose bleed. When examined, there were signs of lobar pneumonia in the right upper and right lower lobes in various stages of resolution; there were many mucous rales. Although the patient was somewhat delirious, the cough was productive and active, the tongue only moderately coated. The pulse rate was 100, the heart action good and strong, the systolic blood pressure was 130, the diastolic was 90. The prognosis seemed dependent on whether sudden pulmonary edema would supervene. The patient died. The circumstances or time of death are not known.

CASE XXIV. M. C., female, aged 10, had been ill one week. The original

infection had been a pharyngitis. Within three days she developed a lobar pneumonia, with fever ranging from 103° to 105°. My first examination revealed massive consolidation of the lower right lobe, with only beginning resolution; there was extensive generalized bronchitis; the lips and finger nails were cyanotic. The child was delirious, the expectoration mucopurulent, but scant. Two days later she developed extensive edema of the lungs and died. Massive stimulation, cupping, and phlebotomy had had no effect in retarding the fatal termination.

Case XXV. J. G., male, aged 28, was suddenly taken ill two days ago with fever and serosanguineous expectoration. His tongue was coated, he was semidelirious. There was massive pneumonic involvement of the right lower and upper left lobes. There were many rales of capillary bronchitis over the entire chest; the patient was cyanotic. He died two days later.

Case XXVI. J. G., physician, aged 30, had been ill for about ten days. At first the physical signs of pneumonic involvement were difficult to interpret because they were masked by generalized bronchitis. Within a few days, however, the signs of a right-sided pneumonia of the lower lobe became marked. The patient was cyanotic throughout his entire illness; his mentality was dulled. On the day that I examined him he had a critical sweat and defervescence. There were still distinct signs of partial resolution of the affected lobe—bubbling and mucous rales—and there were also sibilant and mucous rales over the remainder of the chest. The patient was still somewhat cyanotic. Expectoration was free and mucopurulent in character. The patient also presented an interesting arrythmia; extrasystoles coming singly, or in groups of two and three. Their significance will be discussed later. In the absence of any evidence of organic cardiac disease the extrasystoles were not regarded as of serious importance. The patient made an uneventful recovery; the arrythmia lasted about one week.

Case XXVIII. M. H., aged 35, a fat woman, had been sick two weeks with fever and cough. There had been one attack of epistaxis. The temperature ranged between 101° and 104°. On the day of examination the temperature was normal. She was somewhat cyanotic. There was distinct evidence of a general capillary bronchitis and a resolving double lobar pneumonia. Expectoration was free and mucopurulent.

Case XXVIII. L. L., female, aged 30, had been sick four days; there was no initial chill. She was semidelirious and cyanotic. The blood pressure was 110 systolic, 80 diastolic. The pulse rate was 110. There was massive consolidation of both lower lobes, with resolution and beginning general edema of the lungs. A fatal prognosis was made. She slowly lost consciousness. Despite cupping, atropine, and massive stimulation, she died in twelve hours.

Case XXIX. L. M., aged 29, a rather obese female, had had a severe lobar pneumonia for one week. She was cyanotic, and the temperature ranged between 100° and 104°. Examination revealed signs of a resolving lobar pneumonia at both bases. There were bubbling and mucous rales over the entire chest. Expectoration was fair in amount. The heart action and pulse were good, the rate 100 per minute. A good prognosis was given, but the possibility and danger of the sudden onset of pulmonary edema was pointed out. A later report from the family physician stated that the patient had been quite ill for another week with dyspnea and cyanosis. Expectoration had been scanty. After several weeks she finally recovered.

Case XXX. M. R., female, aged 21, became ill suddenly with fever, cough, painful breathing, and dyspnea. There was complete consolidation of the entire right lung. The patient was pale, breathing was distressingly painful; the general impression was one of extreme toxemia. The pulse rate was 110. A fatal prognosis was given because of the extensive pulmonary involvement

and because there was no sign of resolution. I saw the patient again two weeks later. The intervening history had been that of a somewhat productive cough and fever for about a week, and then normal temperature and apparent convalescence for the succeeding week. There was then a sudden rise of temperature to 102½°. Examination revealed considerable consolidation and comparatively slight resolution over the affected right lobes. Both were still dull on percussion; there was no resolution in the lower lobe posteriorly, and only moderate resolution in the upper. The new febrile attack seemed due to slight recrudescence of the infection in the lower right lobe. A few days later the patient was taken to a hospital and died there shortly after. The cause of death could not be ascertained.

CASE XXXI. Mrs. A. R., aged 35, an obese woman, had been ill several days with a double lobar pneumonia. There had been cyanosis throughout her illness. When I examined her she was *in extremis;* there was general edema of the lungs. The signs of incomplete resolution of a double lobar pneumonia were still present. She died a few hours later.

CASE XXXII. M. V., male, aged 45, had been ill one week with fever, cough, and bloody expectoration. The physical examination showed definite signs of a double lobar pneumonia, involving both lower lobes. There was also evidence of a general capillary bronchitis. The respiration rate was from 40 to 50 per minute; the patient was cyanotic and partially disoriented. The heart rate was 100 per minute. The patient had had a rather critical drop of temperature, and during the examination coughed up some foamy, blood-streaked sputum. General expectoration was also free. It was evident that the frothy sputum was the result of a localized pulmonary edema. The patient slowly improved, cyanosis gradually became less, although rapid breathing continued for a long time. Final examination five weeks later still showed some fine crackling rales over the pneumonic area, and fluoroscopic examination showed slight evidence of consolidation. The patient had had night sweats for several weeks and had lost 40 pounds during his illness. He finally recovered completely.

This lobar group (Group II—B) I considered dangerously ill, even when cyanosis was not marked. Those without cyanosis ran a course similar to the usual nonpandemic type, with this important difference—that edema of the lungs was often a sudden, at times an unexpected, and usually a fatal, event in this pandemic.

GROUP III.

PREGNANCY AND INFLUENZA PNEUMONIA.

I am discussing this as a separate group because, although the physical signs were similar to those of the other groups—i. e., either lobar or lobular—the patients ran a much severer and, frequently, a fatal course.

CASE XXXIII.—M. B., aged 23, first pregnancy of 7½ months, had been sick for one week with fever, cough, and pharyngitis. Two days later the fever increased, the cough became productive. Examination showed a lobular involvement of the left lower lobe. The area gradually spread so that finally the entire lobe was involved. The patient was somewhat cyanotic, but did not appear very ill. The heart action was good and regular. There were signs of general bronchitis. After two days there was some involvement of the lower right lobe, with slight increase in cyanosis. Expectoration was scanty,

thick, and tenacious. The temperature gradually subsided. After two weeks all the signs of pneumonic involvement disappeared. The patient then developed hoarseness due to laryngitis. There was no further temperature. Convalescence was uninterrupted.

CASE XXXIV. Mrs. B. C., aged 30, now in the seventh month of her third pregnancy, had a left-sided lobar pneumonia and incomplete consolidation of the right base. The pneumonia had spread in both lobes. The patient did not appear very ill. After a few days the temperature became normal. Pregnancy proceeded normally.

CASE XXXV. C. D., aged 25, married two months, was pregnant six weeks. One week ago she had had slight coryza. One day ago she developed fever and cough, and slight metrorrhagia. The temperature was 104°, the patient was pale and dyspneic. There was a small patch of pneumonic consolidation at the right base anteriorly and another at the right base posteriorly. The heart rate was 110, regular, and of good force. The patient, however, presented a toxic appearance. A poor prognosis was given. Immediate massive stimulation was ordered. The patient died within two days.

CASE XXXVI. D. H., aged 28, was in the sixth month of her second pregnancy. She had slight coryza and a little fever four days ago. The pulse rate was then normal. The next day she vomited; there was a rapid rise of temperature to 104° and a pulse rate of 140. The patient was pale, dyspneic, and looked toxic. There was a lobar pneumonia of the upper right and of the left lower lobes. The systolic blood pressure was 110. There was very little expectoration. Massive stimulation was ordered, and bicarbonate of soda in large and frequent doses was administered. A bad prognosis was given. The family physician reported that two days later the patient had a miscarriage and died within a few hours.

CASE XXXVII. Mrs. E. M., aged 23, primipara, pregnant 5 months, had been coughing three days. The temperature was 105°, the blood pressure normal. There was a small area of lobular pneumonia at the left lobe posteriorly. The patient did not look toxic, and a good prognosis was given. I again saw the patient two days later. The entire left lower lobe was then involved; there was beginning pulmonary edema. Massive stimulation, cupping, and venesection were resorted to. The patient died twelve hours later.

CASE XXXVIII. Mrs. A., aged 29, in the seventh month of her pregnancy, had had a headache for three days. Two days ago she had chills, fever, and vomiting. The temperature was 105°, the pulse rate 110, the blood pressure was 120 systolic and 85 diastolic. There was flatness over the left lobe and other classical physical signs of a left-sided lobar pneumonia. Although the patient was then not toxic, a grave prognosis was made because there was practically no expectoration. The temperature suddenly fell to normal and stayed so for a few hours. This was followed by a chilly sensation, vomiting, and a rise of temperature to 102°. Atypical lobar pneumonia of the left base developed; there was slight beginning resolution of the right lobe. The patient began to be cyanotic, a condition which gradually became more pronounced. The new pneumonic area remained solid; there was little accompanying bronchitis. Cyanosis, and later dyspnea, became marked symptoms. She then rather suddenly developed edema of the lungs and died within a few hours.

GROUP IV.

GASTRIC CASES.

CASE XXXIX. J. K., aged 21, stated that he was subject to attacks of vomiting, headaches, and fever; these attacks were said to resemble the present one. Three days ago he vomited and had a headache. Since then the vomiting

has been almost constant. The temperature ranged between 101° and 103°. The tongue was coated. The abdomen was rigid, but there was no abdominal pain or area of sensitiveness. Daily careful examination revealed no rales or other signs of pulmonary involvement until five days after the initial symptoms. There were then some localized, superficial, leathery rales at the left base, indication of an atypical lobular pneumonia. The next day there was distant bronchovesicular breathing. Vomiting continued as the striking feature of the disease until a few days later, when defervescence began. The patient then had a little blood-streaked sputum. Two days thereafter he developed a severe laryngitis, which produced an irritating dry cough for one week. Thereafter convalescence was uninterrupted.

CASE XL. M. S., aged 8, had a very slight cough, and a temperature of 103°. The main complaint was vomiting, accompanied by slight epigastric sensitiveness. The abdomen was soft, flaccid, and not tender. Although pneumonia was suspected at the outset, and the lungs were examined carefully daily, physical signs were negative. On the third day, in addition to the gastric symptoms, a slight soft cough developed. A suspicious area of lobular pneumonia in the right lower lobe was then mapped out. The next day the signs were more definite. Two days thereafter the temperature became normal and vomiting ceased.

GROUP V.

CARDIAC CASES WITH INFLUENZA PNEUMONIA.

CASE XLI. Mrs. D., aged 44, had an old rheumatic mitral stenosis. She had been severely decompensated a year ago. Besides the typical endocardial murmur, the chief characteristics then were dyspnea and a right-sided hydrothorax. After thorough digitalization the patient improved, compensation was fully restored and remained so until the present illness. Three days ago she was taken ill with chills, fever, right-sided pain, and bloody expectoration. She complained of palpitation. The temperature was 104°. The heart action was 100 per minute. Expectoration was fairly profuse. There were typical signs of a right-sided lobar pneumonia, with beginning resolution. The patient died during the night, probably of edema of the lungs.

CASE XLII. A. K., physician, aged 55, had had cardiosclerosis and hypertension following an old scarlatinal nephritis. Three days before the onset of his present illness he had slight coryza. Two days thereafter he had a sharp rise of temperature and precordial pain. He was a stout man, and it was impossible to localize the pneumonic area, but the type of onset and the further course of the disease—fever, expectoration, dyspnea, and localized pain—left no doubt as to the diagnosis. The expectoration was always scanty. He died of rather sudden edema of the lungs four days after the onset of the pneumonia.

CASE XLIII. Mrs. C. L., aged 28, had an old rheumatic mitral stenosis. For about one year she had suffered from severe decompensation; the prominent characteristics then were palpitation, severe bronchitis with sibilant rales, and occasional hemoptyses. During the last few months her heart had not inconvenienced her; in fact, she says she had not felt better for years; she was even able to do a fair amount of housework. Three days ago she was taken ill with fever and cough. Examination revealed a right-sided lobular pneumonia posteriorly. There was moderately extensive capillary bronchitis; the patient was somewhat cyanotic and dyspneic. The heart action was not inordinate in rapidity, there was no overaction, the murmur was not exceptionally loud. The pneumonic process did not affect her differently than a similar process in patients with normal hearts. The temperature gradually decreased, to be followed by another rise, due to a pneumonic process at the other base. The final outcome of the case is not known.

CASE XLIV. J. G., aged 47, had luetic cardiosclerosis. The Wassermann blood examination was 4+. Until the diagnosis was established about one year ago the symptoms were dyspnea and epigastric oppression. After thorough antiluetic treatment he improved remarkably. The cardiac symptoms disappeared; the patient was again able to be active in business. One week ago he became drowsy and feverish. He could be roused only by loud questions, but immediately lapsed into semiconsciousness. He was dyspneic; there was a lobar pneumonia at the left upper lobe. Expectoration, at first scanty, was later more productive. His mental state remained unchanged. The next day a lobar involvement on the right side occurred. The heart rate until that time was 110, the heart action and pulse were good. With the new pneumonic involvement, the heart action became more rapid, pulse alternation was occasionally present. There were many rales suggestive of edema of the lungs. He died suddenly four days after his illness began.

I have given some examples of the common types of pneumonia as I have encountered them. A survey of impressions thus gained shows various interesting features. One outstanding fact has been the descending nature of the infection. Often the physician blamed the patient for getting out of bed too soon, or the patient the physician for not giving some remedy to prevent the pneumonic complications after the onset of the initial pharyngeal or bronchial symptoms. The truth was that the pneumonia depended on the type of the infection. Ear complications were infrequent. In the first fifty cases of pneumonia I saw but two cases of otitis media, which opened and discharged spontaneously. Massive pleural exudates and empyemata have been rare thus far.

The opening phases of the influenza infection usually consisted of pharyngeal, tracheal, or bronchial catarrh; the temperature ranged between 100° and 102°, the patients had more than the usual lassitude accompanying this condition; sacral pains were common; prodroma were infrequent. Soon there was a sharp rise of temperature, often introduced by nausea or vomiting, or by a chilly sensation. There was rarely a frank chill. This stage usually marked the onset of a general catarrh of a smaller bronchi (bronchiolitis or capillary bronchitis), accompanied or soon followed by the actual pneumonia. It was this combination of capillary bronchitis and pneumonia which rendered the physical signs so confusing. At the outset I was inclined to regard patients without fairly typical signs of pneumonia as suffering from a rather severe type of "grippe" bronchitis. The frequent presence of pneumonia soon became evident, especially the lobular type (Group I). The signs of pneumonic invasion were often obscure. A localized shower of moist or even dry rales usually near the angle of the scapula, the favorite site, was often the only indication of pneumonic invasion. The rales were heard best with coughing or at the end of forced inspiration. With progressive pneumonic consolidation, one might elicit, in a day or two, high pitched expiration or typical bronchovesicular breathing. Comparison with a healthy uninvolved area

was frequently necessary because of the equivocal physical signs. Occasionally the localized rales were superficial, leathery, and pleuritic in character; they seemed indicative of a pleuropneumonic involvement; later, other corroborative physical signs of consolidation often appeared. That anomalous and atypical physical signs correspond to the pathological picture is evidenced from autopsy examinations in which irregular patches of lobular pneumonia are found scattered throughout the lungs. Such areas may become confluent. Varying degrees of consolidation and resolution may also be found in the same pneumonic area.

The usual duration of the febrile period with a single lobular involvement was three to five days. Many exceptions, however, were noted. It occasionally happened that the fever lasted only a day, although physical signs proceeded as in the other more sustained febrile cases. Invasion of a new lobular area was usually characterized by a drop of temperature to normal or nearly normal, to be followed by a sharp rise of temperature, nausea, or vomiting. A marked rigor was rare, chilly sensations more common. Occasionally the temperature would remain normal two to five or even seven days after the first lobular pneumonia had run its course before the signs and symptoms of a fresh pneumonia appeared. In such instances there was usually delayed resolution in the original pneumonic area and a continued bronchitis.

In the mild, favorable group of lobar infections there was a gradual spread, perhaps by confluence, from the lobular to the lobar type (Group II—A). There was often no increase in the severity of the symptoms or fever. Indeed, the pneumonic infection would occasionally spread with the temperature normal or nearly so. The physical signs and progress in the invaded lobe were then usually not those of a typical lobar pneumonia; dullness instead of flatness, and bronchovesicular rather than tubular breathing, were the characteristics. Resolution was slow, the *rale redux* rare, and a tendency to edema of the lungs uncommon. I interpreted these signs as indicating incomplete consolidation. Capillary bronchitis and cyanosis were absent or not marked. The patients were not toxic, and on the whole the prognosis was favorable.

It was the patients with sudden lobar and massive involvements (Group II—B) who constituted the predominantly serious and fatal cases. The initial symptoms began with chill and fever, or more commonly the lobar pneumonia developed with a sharp and sudden febrile rise during the course of the influenza bronchitis. The pneumonic invasion was often ushered in by vomiting. The great majority of this group showed cyanosis in varying degrees. In extreme instances finger nails, hands, and face were dark-hued; in less marked cases the face, but especially the tongue, was the chief index of the cyanosis. As a result of the study of a series of pneu-

monia cases some years ago, Peabody[1] showed that there was interference with gaseous exchange, with consequent production of methemoglobin in the venous blood in the terminal stage of the fatal cases with bacteremia. In the present pandemic, however, cyanosis was an early sign, although it was often intensified during the course of the severe and fatal cases. A few reports dealing with this phase of blood examinations have stated that methemoglobin was absent.

Cyanosis may conceivably be the result of a specific, as yet unknown, biological destructive blood poison developed in this pandemic. Such chemical changes may indeed be a contributing factor in the extreme cyanosis; but on clinical grounds I do not believe it the chief or only cause in the majority of the cases, for it would not take into sufficient account the widespread catarrhal process and consequent interference with proper pulmonary ventilation, itself often a cause for cyanosis. In addition to the actual pneumonia, the extreme and extensive pulmonary hyperemia—a common pathological finding in the pandemic—may have been an added significant factor in the production of the cyanosis. I therefore believe that cyanosis is probably attributable to two chief causes: First, the extent of the pneumonic involvement and the pulmonary hyperemia, for the lobar pneumonias were often multiple or accompanied by lobular areas. Second, extensive capillary bronchitis. These two were usually combined. In the former, insufficient healthy lung and, in the latter, mechanical blocking of the smaller bronchi with the products of inflammation would sufficiently explain the cyanosis in many cases.

The type of capillary bronchitis often met with was called "suffocative catarrh" by the older writers, a very apt name for the condition. The importance of this bronchitis lay in this, that it greatly affected the prognosis and hampered therapeutic efforts. The patients coughed considerably. Expectoration was scanty if the smaller bronchi were plugged with a thick, tenaceous exudate, a frequent pathological condition; or, if expectoration was profuse, the sputum was bronchial or tracheal, rather than pneumonic in character. To borrow a surgical simile, the pneumonic area did not drain through the bronchi. I believe these facts profoundly influenced prognosis, a phase to be discussed later. When the patients with lobar pneumonia and cyanosis had passed the critical stage, improvement was slow, cyanosis continued for a long time, and resolution was long delayed, although the temperature remained normal, or nearly so, for days or even weeks. Throughout their entire acute illness, as well as convalescence, I regarded these patients as very gravely ill because there was always the danger,

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[1]Peabody, F. W.: Oxygen Content of Blood in Lobar Pneumonia (Jour. Exper. Med., 1913, XVIII, pp. 7-17).

even in convalescence, of edema of the lungs from toxic products which the patients had not been able to expectorate.

From the larger pneumonic cyanotic group was to be distinguished a smaller number who were pale and dyspneic, and whose pulse rate was rapid from the very onset. Indeed, they had a somewhat nephritic appearance and looked toxic. In my experience the pneumonic process never went to the stage of resolution in these patients—they seemed overwhelmed by toxemia; the pulse rate increased and they died seemingly of heart failure. Chemical examinations of the blood of these patients may have shown acidosis, for the patients looked and acted like those with profound acidemia.

Pregnant women (Group III) presented a particularly interesting, although sad, picture in this pandemic. The pneumonic involvements followed the various types already outlined, but the distressing feature was the frequent and at times unexpected fatal termination. This occurred even when the area of pneumonia was apparently localized, lobular, and nontoxic in character. This is well exemplified in Case XXXVII. Of the pregnant women with pneumonia whom I examined, two belonged to the pale and toxic group; the others had chiefly lobar involvements with cyanosis.

The interesting problems in pregnant women were the frequency of the incidence of pneumonia in them, usually immune to infections, and its extremely virulent course. For the present I see no explanation, even tentative, for its frequency in pregnancy, except perhaps some later statistical data to the contrary. Regarding its undoubted virulence, various theories have already been proposed. Toxemia is the favorite one. Normal pregnancy, however, is not associated with any toxemia or acidosis. Although the views I am about to advance are purely speculative, it appears to me that the virulence of the pneumonia may depend on the poisonous interaction of chemical compounds formed in pneumonia with the changed metabolism *normally* found in pregnancy. For example, changes in calcium and magnesium are known to occur in pregnancy, and salt metabolism in pneumonia. A study of glycuronic acid is extremely interesting in this connection. This acid is increased in normal pregnancy. A few years ago a careful observer[2] had shown that glycuronic acid is increased during the febrile period of pneumonia, and that it has the power of combining with many organic substances which occur in the body in the form of chemicals of the glucosidic and ester types. Many other complex bodies are doubtless formed in pneumonia. With our present knowledge, or rather lack of knowledge, one can but speculate on the possible damage an interplay of toxic products may have upon the normal organism, and, specifically, upon pneumonia. My belief is

[2]Medigreceau: On the Excretion of Glycuronic Acid in Pneumonic Infections (Jour. Exper. Med., 1913, XVIII, pp. 259-278).

that metabolic, chemotoxic factors are the probable basis of the virulence of pneumonia in pregnancy.

The pneumonias with gastric symptoms (Group IV) were of especial interest, because at other times the etiological factor—the pneumonia—would probably have been missed. Only careful daily examination finally elicited the correct diagnosis—a localized shower of dry rales and, later, atypical bronchovesicular breathing. The diagnosis in one case (Case XXXVIII) was further borne out by a complicating trachitis and severe laryngitis—an ascending infection after the pneumonia had run its course. The gastric cases are to be distinguished from the referred abdominal pains, occasionally mistaken for appendicitis or peritonitis, which are comparatively frequent in ordinary pneumonias, but were rare in this epidemic. Nor do these gastric cases conform to the not uncommon intestinal "grippe" of the pandemic of 1889 and 1890. Except for the focal, atypical signs of pneumonia, the gastric cases ran the clinical course of an ordinary gastritis.

I have made a special group of the cardiac cases (Group V) because I wished to observe separately the action of damaged hearts to the infection. All of the patients had been compensated for some time preceding the pneumonia. Except perhaps for slight tachycardia, I was not able to discover any difference in the behavior of the damaged hearts to the pneumonia than the normal hearts. All but one of the cases had lobar involvements. In one (Case XLIV) the patient was in semistupor from the onset of the disease. All were more or less cyanotic. With the exception already noted and the fact that the two mitral cases complained of palpitation, the disease progressed with the heart action good until pulmonary edema occurred. In all of the cases but one this was fatal within a few hours of its occurrence.

Reviewing all the cases, I note that sweating was frequent and long continued, even when typical defervescence had not occurred.

I observed three cases of cardiac arrythmia in the entire series. This occurred at the time of crisis. Two had marked sinus irregularity (one of them may have had sinoauricular block), the other had extrasystoles coming singly or in groups of two or three. The comparative rarity and the type of irregularities are somewhat in contrast to other epidemics of ordinary pneumonia, when not only extrasystoles, but complete irregularity of the pulse (auricular fibrillation), was not infrequent. The three cases of arrythmias in this epidemic appeared in patients with typical sharp febrile crises. None of the patients was aware of the arrythmia. Only one of the patients was dyspneic, but his dyspnea was of pulmonary origin, for there was still incomplete resolution and cyanosis. In none was there evidence of cardiac disease. In all the cases I gave an excellent prognosis regarding the heart, for these irregularities, as I

have pointed out in other communications,[3][4][5] are not evidence of cardiac disease, but are the result of toxic action, probably upon the cardioinhibitory center. Where digitalis in large doses has been given, it is possible that the effect of the pneumonic toxin is enhanced or aggravated because of the known effects of digitalis upon the vagus. The arrythmias are not of serious importance, and require no therapy unless the patient is aware of them and they are accompanied by uneasy sensations in the chest; then the bromides or atropine in small doses may be of value. They usually disappear in several days. I have allowed such patients out of bed dependent entirely on the pulmonary, not the cardiac, condition. I have never seen any harm from this procedure, for I have observed some of these cases not only with and soon after the appearance of the arrythmia, but also in after years, with perfectly rhythmical pulses and absolutely normal hearts. I do not consider the arrythmias here described as evidence of toxic myocarditis, an opinion frequently held, and hence do not attach serious significance to them.

What have our drugs accomplished in the present epidemic? In the milder lobular cases the treatment resolves itself in that of the incidental fever and bronchitis. Antipyretics in moderate doses are of value in making the patient comfortable. I have observed no ill or depressing effects upon the heart following their use, although others have attributed sweating and depression, and even cyanosis, to them. As already stated, sweating has been a particularly marked feature of the pandemic and has been present even when antipyretics were not used. Depending on the type of cough, I have used sedatives or stimulant expectorants. When the cough was irritating and disturbed the patient's rest, I used morphine, codein, or heroin. When productive expectoration began, or in order to induce and promote it, I used various ammonia preparations and the iodides. I used the stimulant expectorants entirely empirically, for I have never been able to convince myself of their efficacy.

The important therapeutic effort lies in cardiac stimulation. I shall merely allude to the fact that numerous plans were in vogue, especially in this epidemic, regarding the dosage, time of administration, and kind of stimulation to be employed. My practice has been in this and other epidemics to begin stimulation early in severe cases, or in those likely to become severe. I digitalize early because the fight is usually a short one—the patient recovers or dies within a few days. I have never found any untoward effects upon the heart, kidneys, pulse rapidity, or blood pressure from this plan, nor have I found that the use of any special digitalis prepara-

[3]Neuhof, S.: Therapy of Pneumonia from the Circulatory Standpoint (Med. Adviser, Feb., 1916).
[4]Neuhof and Davidson: Clinical Survey of Acute Pulmonary Affections of 1916 (New York Med. Jour., June 2, 1917).
[5]Neuhof, S.: Clinical Cardiology, pp. 63, 105, 98, 99.

tion had produced any demonstrable difference. When available, and the patient is able to swallow, I prefer the standardized digipuratum tablets. When not available, I have used the tincture. When I wished a quick effect, I administered the latter in 30-minim doses every few hours; when not so urgently indicated, I gave it in 15-minim doses every four hours. I believe that the criticism of the variable strength of the tincture is valid; but when the drug is employed in large doses and frequently, I feel that, gauged by the usual amounts required to digitalize in cardiac disease, the pneumonic patient soon receives enough to properly digitalize him. I have added in exceptionally severe cases in this pandemic a hypodermic of strophanthin in the ampule of 1/1000 strength, even after the patient had already received much digitalis. I have seen neither bad nor good results from this procedure, although I believe the procedure hazardous in ordinary cardiac disease. I have used caffein benzoate of soda liberally, usually in hypodermic form. The average dose has been 5 grains of the double salt in solution, given every two to four hours, depending on the severity of the case. I have also seen camphorated oil used in cases in which I was consulted. I do not believe this drug possesses any chemotherapeutic or stimulatory power, despite its immense popularity in previous years. Phlebotomy I have also employed in a few cases. I believe its chief value lies in getting rid of toxic material. I have seen no beneficial results follow its use in this epidemic. I have employed adrenalin often, but with no effect. In edema of the lungs I have used atropin and dry cupping of the chest, and have crowded stimulation. These procedures had no demonstrable effect in preventing or even retarding a fatal termination.

I have sketched my "plan" of therapy and stimulation in some detail because I wished to demonstrate that I have followed the usual well-known and well-worn methods. I confess, however, that I could observe no beneficial result from the use of stimulation in this pneumonia pandemic. I may also add that for many years it has been my contention that the almost innumerable and varied therapeutic "plans," many of which have already been discarded, have not met with any demonstrable success in my hands, for I was never able to correlate the therapy with any effect upon the circulation. The milder cases required no stimulation. Some of the severe lobar pneumonia cases did get well, it is true, when stimulation of various kinds was used, but I am not convinced that it was the stimulation, and not the specific types of virulence present, that saved these cases.

In personal conversations with many practitioners and consultants the great majority acknowledged that they were therapeutically helpless in this pandemic. And, may I not add, has stimulation helped the circulation in other types of pneumonia? May we not

be compelled to radically revise our ideas of what stimulation can actually accomplish in pneumonia?

In the present pandemic it is of fundamental importance to inquire and study the type of death. Except in the pale, toxic group, with rapid heart action from the onset, the character and rapidity of the pulse and heart action were good and satisfactory, and the blood pressure usually normal. This was true in both the stimulated and nonstimulated cases. There was then a rather sudden change in the cardiac status, usually in those with marked cyanosis. The pulse became rapid, breathing more labored and rapid, and the patients died within a few hours of edema of the lungs. Not all of the patients, however, presented edema of the lungs. Some died suddenly without this symptom. The greatest time of danger to the heart has always been regarded as the crisis. I distinguish two types of crises—the febrile and that of sudden pulmonary resolution. These are not necessarily simultaneous events. A febrile crisis alone is not dangerous, but sudden resolution of a consolidated area has always been regarded, and properly so, as the most critical and dangerous stage of the disease. At such times there is apparently a rapid flooding of the blood and lymph channels with the liberated toxic pneumonic products. Absorption probably occurs quite readily because of the general liquefying process, and because the lymph and venous radicals are released from the pressure of the solidified lung. In other words, chemical and mechanical factors come into play at a time when the toxic products are greatest in amount. The heart muscle is thus bathed liberally and continually with pneumonic poisons. Interference with pulmonary circulation caused by the onset of resolution (and pulmonary edema) is doubtless an added factor in overburdening the right heart. This is particularly true in the present pandemic with its capillary bronchitis.

It has been shown experimentally[6] that a heart washed with pneumonic blood loses in efficiency, depending on the amount and speed with which the pneumonic blood is introduced in the prepared heart. When the pneumonic blood is washed out with Ringer's solution, the heart regains its power. I believe these experiments have their parallel in man. With a slowly resolving pneumonia, and therefore a gradual toxemia, the blood stream and heart can cope, either by the production of antibodies, or because the poisons are not sufficient in amount to entirely cripple the heart. At the pneumonic crisis, however, the blood stream and heart are overwhelmed, with consequent tremendous loss in cardiac power. Markedly cyanosed cases of the present pandemic may be those in whom not much added toxic pneumonic products liberated at the crisis are necessary in order to produce sudden and as yet unexplained deaths. These deaths do not seem primarily circulatory—

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[6]Neuburg and Porter (Jour. Exper. Med., 1913, XXII, p. 123).

they may conceivably be due to unknown effects of specific pneumonic poisons upon the spinal centers.

Various pathological reports have emphasized dilatation of the right side of the heart, congestion of the viscera, and distention and turgescence of the capillaries. The heart muscle itself was usually well preserved, and cloudy swelling was uncommon.[7] Clinical considerations and the experimental observations just stated would seem to offer plausible explanations for this pathological picture. Interference with venous return throughout the disease was common, and a sudden absorption of toxins may kill quickly and not leave much demonstrable pathological damage to the heart muscle in its wake. Were such a study possible, more severe pathological changes—marked cloudy swelling and disintegration of muscle fibers—might be found to run roughly parallel with the amount, rate of absorption, and type of the pneumonic toxins. This appears to me an important problem for experimental medicine. I exclude in this pathological picture actual bacteremias in which the heart is riddled with microscopic emboli and the muscle widely destroyed.

Bearing in mind the clinical, experimental, and pathological data just detailed, may we not find therein sufficient cause for heart failure and death, and the futility of cardiac stimulation in this pandemic? Can cardiac stimulation of any kind, no matter when begun or how continued, counteract pneumonic poisons which are being continually absorbed throughout the disease, and which at certain times—the crisis—are absorbed rapidly and in great amounts? This appears to me the fundamental problem of cardiac stimulation in pneumonia. I believe we must possess, in addition to stimulation, serological or chemotherapeutic methods for counteracting or nullifying the pneumonic toxins, or some method of changing a rapid into a slow resolution. Perhaps even a mechanical method for literally aspirating pneumonic products, by suction or otherwise, is not impossible in these days of advance in tracheal insufflation. The heart can withstand a certain amount of toxins, moderate in quantity and slowly, not suddenly, thrown into the circulation. Elimination and antibodies can then perhaps keep pace with production of toxins. Otherwise cardiac power is slowly or quickly weakened, and cardiac stimulation is usually of no avail.

As already mentioned, accompanying capillary bronchitis (suffocative catarrh) has been an added factor in increasing the fatal incidence of the pneumonia. The patients have coughed considerably, but the cough and sputum were bronchial rather than pneumonic. The bronchitis had lessened, so to speak, the chances for lung drainage. Unless the *pneumonic* products can be expec-

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[7]Symmers: Pathological Similarity Between Pneumonia of Bubonic Plague and of Pandemic Influenza (Jour. Am. Med. Assn., Nov. 2, 1918).

torated, or unless resolution is aided by a gradual loosening and consequent absorption of some of the pneumonic exudate, the chances for a sudden liberation of the toxins become greater, and with it the chances for sudden edema of the lungs and cardiac failure are enhanced. While therapeusis has for the present nothing better to offer, cardiac stimulation should be practiced, for it would be inhuman to sit idly by without at least attempting to save our patients. We should, however, attempt to learn the cause of our therapeutic failure, and thus be stimulated to new and, perhaps, novel therapeutic endeavors.

THE UPPER AIR PASSAGES AS CARRIERS OF INFECTION.

By D. BRYSON DELAVAN, M.D., New York.

The susceptibility of the upper air passages to the reception of various forms of infection has been recognized since the beginnings of medicine, as witness the familiar "God bless you!" to the person who has sneezed, the sneeze having been an early symptom of a certain plague.

Within the past few years much attention has been devoted to the question of the importance of the part played by the nose and pharynx as ports of entry for certain types of infectious germs. The more this matter has been studied the more evident has become its importance, until now it seems to have been proved that successful protection of these parts would do much to eliminate the dangers of several serious forms of epidemic. This much having been demonstrated, the question naturally arises as to how best the upper air passages may be guarded from invasion, and, when invaded, in what manner the microorganism may be most quickly and effectively destroyed.

The protection of the air passages is difficult; nevertheless there are many who believe in the efficacy of masks and other similar devices by which the air may be filtered before entering the system. The inhalation of various drugs has been suggested, and for many centuries the custom of carrying around the neck a small bag filled with camphor or some other such material has prevailed. We have even seen instances of this during the past epidemic. Masks of various devices have been used, and sometimes recommended by boards of health. Others have inserted pellets of medicated cotton into the vestibule of the nose, thus endeavoring to sift from the air its impurities. Many years ago it was suggested that the atmosphere of the room occupied by the patient be impregnated with the vapors of various drugs, and good results in the protection of those caring for the invalid were reported. While these and similar measures of protection may avail to a greater or less degree, there are many other infectious influences for which they could hardly be practically utilized.

In the great majority of instances the methods on which we are obliged to rely are such as must be employed after the infection has found lodgment in the throat. It, therefore, becomes necessary for us to determine what particular localities in the upper air passages are most likely to engage and retain the infectious organism and to devise the best means for their destruction. Careful studies

by several excellent observers have demonstrated that most micro-organisms show a decided preference for the upper regions of the nasal cavities, and that they elect those parts of the throat which are rich in lymphoid tissue.

The reasons for this are easily understood. The upper half of the nasal cavity is not only narrower than the lower part, but even under normal conditions is more or less occupied by the projection created by the superior turbinated body. While access to it may be entirely free in a perfectly shaped nose under normal conditions, the slightest swelling of the soft parts, especially those of the middle turbinated body, is almost sure to hinder access to the parts above; thus any attempt at cleansing the upper part of the nasal cavity by ordinary means would fail. In those regions in which lymphoid tissue abounds—for instance, the vault and walls of the pharynx, the faucial tonsils, and the lymphoid tissue at the base of the tongue—eradication of the infection is difficult because of the tendency of the microorganism to hide in the depths of the recesses formed by the lymphoid masses, or to locate themselves in those of the tonsillar crypts. Ordinary spraying or douching will not reach the upper regions of the nose, while the application of drugs or the use of gargles for the pharynx and tonsils succeed only in reaching the surfaces of those parts.

In order to secure the best results, it is absolutely necessary that the anatomy of the tonsils and the nasal cavities be clearly understood and the inaccessibility of their parts recognized. The value of any method of disinfection must, of course, depend on the thoroughness with which the disinfecting medium is brought into contact with the ultimate recesses in which the offending germs are lodged. The attempted disinfection of the throat and nasal cavities has often failed because this all-important principle has not been recognized. The writer has long been convinced of the importance of this fact, and for many years has adopted a method calculated to secure the intimate contact of the disinfectant with all the foci of infection in the upper air passages, including those too remote to be reached by the ordinary methods. The essential feature of this procedure is based on an evident and simple mechanical principle which has yielded the most practical results thus far obtained. It consists in the most complete possible uncovering of the parts to be treated preliminary to the application of the disinfectant. Heretofore this suggestion has not been advanced or carried out.

For its proper application, the regions in question—namely, the nose, the nasopharynx, and the oropharynx—should be most carefully cleansed by means of some mild alkaline solution, and then thoroughly treated with applications of adrenalin or some other similar astringent for the purpose of contracting the blood vessels and causing a subsidence of the turgescence of the soft tissues, and

thus exposing as far as possible all of the recesses likely to harbor the infectious agents. Following this, the cleansing spray should be carried as far as possible into the remotest cavities for the purpose of removing all secretion intervening between the surface of the membranes and the disinfectant solution. Finally, the disinfectant itself should be applied. Generally speaking, this must be effected through the use of a spray or of an injector of very fine caliber, by means of which the disinfecting fluid may be introduced thoroughly to all parts required.

A number of disinfectants have been used for the sterilization of the throat, several of which have undoubted value. Solutions of carbolic acid, permanganate of potash, nitrate of silver, alcohol, all have had their strong advocates. In the last two years several series of experiments have been carried on by different observers for the purpose of determining the relative value of the various disinfecting media in common use. Of these the most important are the investigations of Dr. Henry Drysdale Dakin.[1]

Dakin has proved that, among the most useful of our disinfectants, one stands preeminent. This is known as dichloramine-T, and it possesses an intense germicidal action corresponding with its high content of chlorine. It differs slightly in chemical composition from its nearly related chemical product known as chloramine, the basis of the now celebrated Dakin-Carrel fluid so extensively used in general surgery. In order to prolong the effect of the disinfectant, Dr. Dakin and Dr. Edward K. Dunham have found that as a solvent some oily medium is better than water. The most useful thus far found by them for this purpose is one obtained by the chlorinization of paraffin wax, to which they have given the name of chlorcosane. Eucalyptol mixed with paraffin and an oil made by the prolonged chlorinization of eucalyptol have both proved irritating and unsatisfactory. Chlorcosane has seemed decidedly preferable.

By the addition of a certain percentage of dichloramine-T to the chlorcosane oil, a proper solution for disinfectant purposes is obtained. The method of making the solution is very simple. Twenty-five percent of the amount of chlorcosane intended for the whole amount of solution desired is heated to a temperature of 150° and the proper amount of dichloramine-T is added. It dissolves very quickly, and, when dissolved, the remaining 75 percent of the chlorcosane should be added. The strength of the solution may be varied from 1 to 5 percent of the dichloramine-T—the latter for application in the less sensitive regions of the body. For application to the throat and nasal passages a strength of 2 percent is as great as can usually be borne. Where this is found to be irritating, the strength may be reduced to 1 percent, or even less, and the solution still found to be effective. There is no advantage in using

it in a high degree of strength, since the weaker solution will answer the purpose, and it is desirable to avoid irritation.

Various methods have been used for making the applications of the chlorinated media and the disinfectant to the nasal and pharyngeal regions, as, for example, the inhalation method. The results seem to show that the direct application of the oil solution is more prompt in its action, and that in complicated cases the number of treatments required is far less. The apparatus employed is simple and readily manipulated by anyone who has the slightest skill in such work.

It must always be remembered that many infectious micro-organisms have the power of penetrating beneath the surface and burrowing themselves more or less deeply in the substance of the underlying tissues, especially if those tissues are lymphoid in character. In the case of carriers, for example, where a reasonable amount of effort has been made, unsuccessfully, to secure disinfection, and where hypertrophies of the lymphoid tissue exist, with masses of adenoid tissue at the vault of the pharynx or an enlargement of the faucial tonsils, it will be evident that the disinfectant cannot be brought into immediate contact with these submerged colonies. In such cases the most prompt and effective treatment is to remove the hypertrophy—in other words, to take away the adenoids or extirpate the tonsils.[2]

The practical application of this theory demands that particular attention be paid to the following points:

1. The recognition of the principle on which success absolutely depends—namely, that in order to carry the dichloramine-T chlorcosane solution to the chief foci of infection, these foci must first be thoroughly exposed, as described above.

2. The application of the dichloramine-T solution by means of a properly constructed spray atomizer, the air current being supplied, if possible, from an air condenser and not by means of an india-rubber handball.

3. The devotion of time and painstaking care to the effective carrying out of the treatment.

I have personally used this method sufficiently to believe that in it we have a means for overcoming infections of the upper air passages which is more simple, safe, prompt, and successful than any hitherto known.[3]

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[1] For a complete exposition of the subject see "A Handbook of Antiseptics," by Henry Drysdale Dakin, D.Sc., F.I.C., F.R.S., and Edward Kellogg Dunham, M.D., Emeritus Professor of Pathology, University and Bellevue Hospital Medical College, Major Medical Officers' Reserve Corps, U. S. army (Macmillan Company, New York, 1918).

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RESUME OF RECONSTRUCTIVE THERAPEUTICS.

Descriptive Outline.

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Therapeutic comprehensiveness is achieved by approaching problems from the standpoint of not only primary origins, but also by reducing to a negligible minimum all sources of secondary origin or contributory disturbance.

The first approach is the province of modern scientific medicine, which is now on a satisfactory plane of advance. The latter leaves much as yet to be desired; it is developing slowly, but has received an important impetus through attention now being focused through repairing effects of military exigencies. We may confidently hope for the general appreciation of a large group of accessory or supplemental measures capable of contributing as much to human betterment as through the socalled more scientific avenues of research.

To this second grouping of expedients or resources we may apply the term reconstruction remediation; not that it is a satisfactory one, but fairly descriptive until a better is devised.

It would be desirable to form a clear working concept of the nature and resources of reconstruction. Among them are included processes of development, of readjustment, of setting disturbed parts in order; hence of orthopedics, of orthobiotics or biokinetics.

Attention may be urged to the well-established fact that, when there is removed, brought down to an irreducible minimum, whatever source of focal sepsis, irritation, or other morbid agency which exists; when also favorable oportunities are afforded for functional equilibration, or spontaneous readjustment, there still remains urgent need for particularized help, guidance, even coercion. In brief, nature will not, or cannot, always carry on restorative processes to complete restitution and adaptation after removal of definite inflictions or disintegration without expert assistance or compulsion.

Another significant fact or group of facts deserves more attention of clinicians where sources of irritation have persisted long or severe enough, alterations come about in the function, and more or less in the structure, of the subsidiary centers, particularly at the intervertebral levels.

As illustrative of one group of such reflex phenomena, let me

refer to observations, elaborated elsewhere, to the effect that uniform phenomena appear of localized spasm and tenderness in paravertebral structures referable to corresponding levels of innervation. These serve as reliable indicia of local irritation, pointing, with much certitude, to areas, and hence to structures affected.

Also other reasonable inferences seem certain. One is that wherever there are found, on palpation, areas of tenderness and rigidity (spasm), these point to sources of reflex irritation, mild and negligible though some may be, yet are relievable by rational measures. Their removal assuredly minimizes vague distresses and oftentimes clears up grave suspicions.

It is of special interest to know that relief of these spasmodic and hypersensitive conditions seems to reduce, and uniformly, through adjusting reflexes, not only the irritation, but also the original causal condition. Thus the part dominates the whole— i. e., relief of the disordered part contributes generously to restoration of the organism as an entirety.

These statements may be challenged, or their importance belittled, until the economic bearings of the patent facts can be demonstrated. It is my hope to meet and satisfactorily explain most of the fairly put objections later; if unable, it may be that further light will be shed on the findings.

This principle of helpfully influencing centers by exerting effects on the part through mechanical, manual, thermal, photic, or other agencies (not omitting considerations of the psychogenic) constitutes reconstructive therapeutics. The subsidiary centers, also nerves in continuity, are likewise readily reached and acted on directly by similar agencies. The correlation or combination of both drugs (pharmacodynamics) and externally applied physicodynamics (or biokinetics) are usually needed. This last includes dietetics and regulation of behavior (personal hygienics).

Procedures on this clinical principle of reconstruction have obtained as yet comparatively little recognition or confidence, and for several reasons, some good and others erroneous, or due to prejudices. One of the misleading objections is the tendency for even wise clinicians to reject novel ideas unless based on biochemistry and, to be hypercritical, or biophysics. To be sure, the nonsense perpetrated by proponents of biokinetics is nearly as great, but not quite as erroneous as those based on wishful thoughts through biochemistry.

By the term *reconstructive therapeutics* we may understand the selecting, correlating, and applying of suitable external agencies capable of meeting the needs of a suffering individual; also of fortifying the vital powers to resist direct and overcome indirect hurtful influences or their effects, giving an individual opportunity of accomplishing in accord with inherent personal capabilities. No

one measure should be overexalted nor subordinated in the consideration; changes or radical modifications can be readily made as conditions alter.

Evidence exists to the effect that the potency of drugs (pharmacodynamics) has been accorded more attention and greater confidence than remedial adaptations of forces residing in biophysics (physicodynamics). Abundant powers and possibilities are afforded through utilizing and adapting the principles of biophysics —in rendering so available latent biodynamics as to greatly enhance development and restitution.

It would seem we are here, as yet, only on the outer fringe of this enterprise of reinforcing latent, or awakening dormant, powers for self-repair in the man who has got the disease as contrasted with modifying and controlling disease when it has got the man. The trend of public confidence already lies that way. The subject not only deserves, but is receiving, fuller confidence of the same grade of investigators found among our brilliant clinical laboratory research scholars. Reconstructive interpretation constitutes merely another somewhat radical angle of approach to the same goal in both diagnosis and treatment.

Among reconstructive agencies we may enumerate:

Behavior and Its Regulation.—Right conduct is the chief agency for preserving health under all circumstances and for recovering health if or when impaired. Some part of this regulation can be supplied by experts and such influences as they can exert, but the greater part is by the experts teaching conscious control over residual energies, those capable of being exerted by the individual in his own behalf.

The chief domain of regulation is through—

Remedial Agencies.—Applied from without, not put into the body to produce results, but exerted on the human being—the organism as a whole—for the purpose of influencing repair and survival values by rousing latent, inherent powers (biodynamics) in order to not only fortify the organism against the onslaughts of disease, to restore health if or when impaired, but to reconstruct, to rejuvenate, to raise in many instances the coefficient of vigor above that which it had ever been before.

Among agencies applied to the organism as a whole and from without may be mentioned—

Personal Hygiene, Regulation of Conduct, Exertion and Economic Modification, Conscious Control.—Raised to "nth" power and carried into every aspect of clinical effort, along with such other measures as are capable of fortifying the man against the effects of disease and to recover him from its effects.

Regulation of the Mind, the Selfhood, Personality (Psychogeny-psychodynamics).—"The word in season," command, exhortation,

explanation, sympathetic appreciation, invitation of confidences, persuasion, appeal, the inculcation of high ideals, loyalty, the citation of graphic and parallel illustrations, and such means of securing attention by direct suggestion or indirectly by mental dissociative means as may promise the best effects desired in the instance.

The mind and body (psychosoma) being a unit, one and indivisible effects must be calculated as influencing both. Special attention may, however, be needed bearing more on one or other aspect of being, as conditions shall decree or demand, such as:

Regulation of Action.— (Somatogenic and psychogenic or psychosomatic regulative measures, conscious control) ; stimulation to action, to do (actuation-kinesthesis), or, per contra to statics, coming to rest (akinesis) ; restraining overaction (inhibition), regulating the phenomena of overaction, of tension, of protective or substitutive spasm, of modifying frantic action ; by encouraging to conservative action when under action is hurtful; by supplying guidance, direction—in short, by rousing latent energies and putting them into line through—

Education.—Training in systematic conservation and direction of purpose, a setting of inherent forces in orderly, hence economical, array (integration) ; by supplying suitable positions of advantage, by encouraging, guiding, teaching self-mastery, conscious control throughout of—

(a) Normal structures (construction), whether underdeveloped or overdeveloped, bringing them into line, up to norm, or by restraining, modifying, limiting, correlating, adjusting, and adapting.

(b) Abnormal structures (reconstruction), regulating effects of errors in development, of departures from the strict norm, effects of bad habits, and disposing of the residue of disease, of injury, of disablement, of crippling; by supplementing, by substituting (prosthesis), and the like rational helpfulness.

The laws of biophysics oftentimes furnish the most useful, reliable, and adaptable hints for devising agencies for effecting relief in a large variety of disordered states. They afford invaluable adjuncts, and are oftentimes capable of serving alone even after diverse well-chosen biochemic or biologic agencies had been used with inadequate or unsatisfactory effects.

By means of applied biophysics (biokinetics as a part of biodynamics), structures can be placed in conditions and positions of advantage, or rescued from positions of disadvantage.

Among the fundamental reconstructive agencies are *mechanical, thermal, photic, electric, radioactive,* also always taking into consideration the *psychogenic* master agency.

Among useful agencies are—

Mechanotherapeutic.—Manual; the hand is the most adaptable and efficient instrument known; it is capable of almost limitless

adaptation, application, and differentiation, alone or when armed with some simple object, tool, or device It can be employed in limitless directions and degrees, by pulling, pushing, pressing, and relaxing; by traction, torsion, rotation; also in restraining, replacing, differentiating, adjusting, molding.

The hand, armed with simplest devices—e. g., bit of rubber and hammer—by concussion is capable of influencing spinal reflexes, etc.[1] Also the hand is capable of influencing vasomotor action through reflex centers so as to dominantly influence the ebb and flow of fluids, blood, and lymph propulsion.

Thermotherapeutic Devices.—Heat or cold, applied through the medium of water in many forms, also by air, hot or cold, moist or dry, by fans or closed chambers, by freezing mixtures, ethyl chloride (CO_2, snow); also by water (ice); superheated dry air (Tyrnauer apparatus, etc.).

Remedial Baths—Hydrotherapy, Hydrology, Balneotherapy, Water Cures, Packs, Spa Therapy.—Elaboration of or systems of adaptations of cold, heat, air, electricity, movement regulation, sun heat (heliotherapy), in their diversified manifestations.

Phototherapeutic Devices.—Agencies for transmission and application of light in special forms. Heliotherapy, the sun rays direct, as at seashore or mountains, or its equivalent (indirect) rays filtered through quartz; the Alpine sun lamp of Heraeus, of Kromeyer, Negelschmidt, etc., whereby the ultra-violet rays are rendered safe and applicable.

Electric Devices.—Electrotherapeutics is a department of endeavor all to itself. Electric effects are analogous to mechanical, thermal, photic, etc. Among the devices to be especially mentioned are diathermia, Morse's sinusoidal device, etc.

There may be considered the application of sundry devices for applying heat and light and electricity.

Devices to Regulate and Enhance Inherent Attributes or Qualities.—The awakening and utilization by mechanical or thermal or photic stimuli to action from without. Reflexes—vasomotor reflexes, influenced through pressures or concussions on paravertebral structures, enhancing vasoconstriction, ebb and flow of fluids, etc.[2]

Regulation of Growth Forces.— (Sajous-hemadenology or endocrinology.) Inherent forces are capable of being set in orderly array, of being placed at advantage or at disadvantage. These can be influenced through stimulating the reflexes, surface and deep;

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[1] Albert Abrams: Spondylotherapy; see suggestive articles in American Journal Physiology, Dec., 1916; Ransom and Billingsby: Afferent Spinal Pathways and Vasomotor Reflexes; Edgar F. Cyriax (New York Med. Jour., July 23, 1910, et al.); E. A. Tracey (Boston Med. and Surg. Jour., Aug. 10, 1910); much data in F. M. Pottinger's monumental work on Tuberculosis, 1917.

[2] See the whole subject of Reflexo-diagnosis, Reflexo-regulation, Reflexo-remediation, called by Abrams, spondylotherapy; also article by author, Spinal Significance or Common Denominators (Am. Med., June, 1918).

also by other forms of remediation, but mainly by feeding of glandular substance, which is diet, not drugging.

Education, Training.—Directing self-control, self-mastery, self-regulation, through acquiring conscious control of forces—in short, first teaching by an expert, followed by expert self-guidance in specialization, and in elaboration of—

(a) *Normal Structures.*—(Construction), the disciplining or drilling of overdeveloped or underdeveloped structures. To encourage, to restrain, to modify, to relax, or to subordinate motion (biokinetics or kinesiatrics). This includes the very important subject of special muscle training by an expert (a real expert), in order to regain power, poise, distribution of motivation, and the attainment of full motor control in repose; rest treatment, (akinesitherapy), also regulated rest by systematized procedures and adjuvants.

(b) *Abnormal Structures.*—Reconstructive devices and procedures applied to repair abnormal effects, departures from health, depreciations, deteriorations; to correct or amend disturbed health, impaired motor, and other factors in equilibration, functional disorder, especially as exhibited in the biokinetic, reflex, etc., domain, as well as in the biochemical, secretory or enzymatic.

By Eliciting, Guiding, and Adapting the Force of Gravity to the Problems in Hand.—Ponderability, adjustment of or regulation of the weight of parts; this involves artificial support, especially where the natural supports are inadequate, supplying aid as required to the muscles, to the bones, to the lungs (pleura), to the circulation, to the hollow viscera, to abdominal organs, to testicles.

By Exerting Pressure and Counterpressure.—To regulate or equilibrate underpressure or overpressure, to mitigate or remove evil effects of, for example, overtension of muscles, tonic spasm; to mollify, to render supple or pliant a local rigidity in muscle masses or isolated (as the scalp); to remove excess pressure on nerves, as in impaction of tooth, overgrowth, bone growth, osteophytes; to compensate or remove a projecting mass, as of extra rib, etc.

Methods of Approach to the Clinical Problems from the Standpoint of Reconstructive Remediation.—In forming an outline of reconstructive diagnosis and therapeutics, clinical subjects deserve consideration from at least two or three angles. Each factor is capable of approach from not only two or three directions, but by two or three methods; and especially in this connection the bearings and resources of biophysics as well as biochemistry are to be reckoned with.

The standpoints may be indicated thus: (a) the *systemic or constitutional conditions as originally existing;* (b) as *affected by modifying factors,* such as age, status of development, condition in life, degree of exhaustion, etc., as well as by preexisting disease states;

(c) *the status of primary development,* whether the individual is up to a relative norm or below; degrees of permissible variants as to general state or particular state, stability or hypersensitiveness, not only of the noble organs—heart, blood vessels, kidneys, lungs, etc.—but also the condition of the ductless glands, and (especially for our purpose) the *status of the gross conformation,* the anatomical and functional competency, musculature, bony, ligamentous (static), and dermal makeup; especially the integrity or pathology and responsiveness of the reflexes.

(d) *Status of Present Mentality, Emotionality, and Morale.*— In addition to the psychophysical (or psychosomatic) status as mentioned above, whether the element of mental confusion, anxiety, or loss of control is prominent or dominates to such an extent as to require special attention—e. g., status of courage, susceptibility to adverse suggestion, to fear, to anxiety, to worry, etc. If deteriorations (hyploplasia) exist, determine whether they be inherited (developmental) or acquired (environmental); what they are and how they are capable of being modified.

The psychogenic status exerts a direct as well as an indirect bearing on all *exhaustion states* for the reason that even a moderate degree of minus or impaired control (as shown by psychic hypertension—strained attention) is wasteful of energy (e. g., strained expectant attention—cat lying in wait for a mouse), which acts as a leak in reparative or restitutive powers; also psychoses—somatopsychoses and psychoneuroses and the asthenias; also other disturbances of equilibria.

Here we have the realm of the mental complexes, impressions or impulses, and their suppression from simple psychopathies to bewildering confusion states, all of which react on the physical makeup, and deserve appropriate treatment not only by reaching first an understanding whereby the psyche is set free from its mental shackles, but, second, the body is likewise set free from pernicious mental and physical habits of underdoing or overdoing, of badly poised feeling and of thinking.

The normal impulse to do is pleasant; when permitted scope and indulged in, one is thereby relieved; the result is agreeable. When checked (for whatsoever reason), the repression is disagreeable, and, when complicated by the repetition of anxious impulse and repression, the result is psychic hypertension (exhaustibility), anxiety, bewilderment. Action affords relief—is constructive; forced inaction is exhausting to both mind and body. Hence the need for regaining conscious control, mental and physical. The greatest benefit comes from doing; hence remedial measures which fail to include guidance in right and accurate doing is only partial and often inadequate.

Functional disorders are the results, in great measure, of fear,

of repeated self-suppressions, psychic hypertension, inducing peripheral disturbances, impairments of metabolic processes, lead-ing to local irritations, which irritations are reflexed on and by the subsidiary sympathetic centers in the cord, inducing exhaustions of cell bodies in the cord levels, retroactions on the paravertebral structures, shown in local tenderness, spasms, and rigidities; hence also occur or are produced referred pains. Relief is threefold—first, by local mechanical stimulation; second, to soothe or relax the parts; and third, to encourage vasomotor activities in the sites of peripheral irritation, whereby locally disturbed function is re-paired in part, readjusted at the fountain source.

Convalescent States.—Deserve systematic attention to the parts impaired as well as to the organism as a whole. There will be found on search a number of local disturbances capable of marked and definite amelioration, which, being supplied, will result in rapid release of dormant or depressed energies involving reaction along vegetative, sensorimotor, and psychic levels.

Regulation of conduct is thus imperative; this involves guidance in not only right feeling, thinking, and doing, but also passive things done to the ailing creature. One of the chief means is to direct the circulatory, the neuronic, the psychic, and the motor mechanisms from without, in which the efficacy of passive acts are materially enhanced by substitution of impulse as well as by guid-ance in other transformations of energies.

Chronic Disease Becomes a Point of Departure.—Not only for influencing (a) the forces at work which act to produce the imme-diate or direct effects of the disease process, but also for (b) the effects (retroactive) on the organism as a whole; the physiologic features being much the same in kind, but different as to degree.[1]

Acute Disease.—In acute diseases the processes of the body are acutely or actively disturbed; hence the general measures required are relatively simple—e. g., rest of function and rest of organism as a whole, of both mind and body. The particular measures need to be specifically dealt with in accord with the nature and extent of causes and their primary effects. Merely to put to rest and apply appropriate medication is by no means sufficient to obtain consistent results. Favorable conditions must be supplied and dominantly particularized to meet psychic as well as biochemical and biophys-ical requirements.

In acute conditions arising in or accompanying chronic diseased states many reconstructive or biokinesiatric remedies are indicated, demanded. Results can be greatly enhanced by taking into con-sideration developmental or acquired faults, and in getting a long perspective on the clinical history of the individual in the light

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[1]See paper by author, Chronic Disease (Monthly Cyclopedia of Practical Medi-cine, Feb., 1912).

of a comprehensive review of agencies capable of raising the vital index through first learning what the available energies are and how to get at them. Likewise to regulate conditions of environment so as to limit all adverse, and to enhance all favorable, influences on the organism as a whole.

There is also the highly significant status of mental integrity, such as the milder or more obscure variants in mental normality, the higher grades of mental retardation, feeble-mindedness, of the moron or hypermoron, and a distinguishable group called by Prof. Richard J. A. Berry and S. D. Proteus "Social Inefficients," those who cannot take and hold their place in the ordinary school or community. They are not necessarily mental deficients; they may have defective control, but they equally have abnormal instincts; they easily succumb to social temptations, are particularly susceptible to adverse pressure of environment as well as of innate tendencies.

Here we have the asocial group—prostitutes, alcoholics, the irresponsible; easily tricked, embittered, sullen, unhelpful of self when ill or of others with whom they share responsibilities. They are of unclear perception; hence assume prejudices. C. B. Davenport has classed them as of "feeble inhibition." These form far more complicated problems than those appraised by determining the levels of intelligence in terms of mental age (Benet-Simon tests). These individuals cannot be detected by their physical appearance; they may differ in no notable respect from the intelligent man, not only in outward appearance, but in conversation and bearing.

TRAUMATIC RUPTURE OF THE URINARY BLADDER.

By OLIVER J. FAY, M.D., Des Moines, Iowa.

There has been a wide difference of opinion in regard to the relative frequency of subcutaneous injuries of the bladder. Among the older writers such injuries were considered very rare. Bartels, who in 1878 compiled a series of 169 subcutaneous injuries to the bladder and a total of 504 injuries of all types, stated that any injury to the bladder in times of peace was to be considered a great surgical rarity. Only six years later Rivington found 322 subcutaneous injuries recorded, but he, too, considered them of rare occurrence. The writers of this century have been less inclined to look on subcutaneous injuries of the bladder as the *rara avis* in traumatic lesions of the abdomen. Seldowitch asserts that this generally accepted belief in the rarity of subcutaneous injuries is only another instance of an erroneous statement which, once having found its way into medical literature, is handed down by one writer to the next. He points out that the 322 cases which Rivington was able to collect in 1884 outnumber Petry's compilation of 219 cases of injuries to the gastrointestinal tract, made a dozen years later. This author then goes on to demonstrate that subcutaneous injuries to the bladder are in reality among the most frequent of abdominal injuries, and incidentally succeeds in demonstrating what has so often been shown before—that statistics may apparently be made to prove anything. Pleschner collected 191 cases of subcutaneous injuries of the bladder from the literature of the years 1905 to 1914, and for the same period found 320 cases of kidney injuries. These statistics, collected by the same man and for the same period, are probably a very fair index of the relative frequency of these injuries. Since ruptures of the kidney are outnumbered only by ruptures of the liver and are somewhat more frequent than are ruptures of the bowel, subcutaneous injuries of the bladder are thus shown to be less frequent than those of the liver, kidneys, or bowel, and more frequent than those of the lung, stomach, pancreas, or even the spleen.

Mechanism.—The accidents which determine a rupture of the bladder are commonly those of a severe type, and the traumatizing agent acts directly upon the bladder, except in the exceptional case. There are three prevalent types of accidents:

1. A blow from some hard object over the bladder region—e. g., the kick of a horse or a man, a blow from a fist, running against some object with sharp corners.

2. Falling from a height, as from a tree, down stairs, from a scaffolding, or being thrown to the ground.

3. Crushing injuries, as when a man is pinned down by some heavy object, caught between the bumpers, run over by a vehicle, or buried in an earth slide.

Two adidtional causes of rupture of the bladder are sometimes given:

4. Overdistention of the bladder, before operation, or for the purpose of diagnosis or treatment.

5. Straining, as when lifting some heavy object.

The first and third of these groups take in the largest number of ruptures, and are, in fact, closely related to the mechanism of the injury. In the first group the injuries to the bladder are usually isolated, though occasionally associated with ruptures of the gut, while in the third group, where traffic and railroad injuries predominate, there are often multiple visceral injuries, and fractures of the pelvis and of the long bones are a frequent complication.

No hard and fast line can be drawn between the first and the second groups, for the difficulty of establishing the exact nature of a given accident is well known, and, if in falling the victim strikes against the region of the bladder, the injury sustained is essentially that of the first group. Under this second group are to be included only those injuries in which the bladder was not directly traumatized, but in which the rupture of the bladder occurred as the result of concussion. Where the victim falls from a considerable height, striking on his feet, back, or buttocks, the theory that the ruptures of the bladder, like the ruptures of parenchymatous organs, or of other viscera containing fluid, are the result of the sudden arrest of the body, while the heavy, urine-filled bladder continues in the line of motion, is quite acceptable, but thus far we have no acceptable explanation for those rare ruptures of the bladder which follow a blow upon the back or nates.

The majority of bladder ruptures, however, are to be explained by some simple laws of physics:

1. A hollow body with elastic walls bursts when these walls are overdistended.

2. This overstretching may be prevented by surrounding the hollow body by a rigid mantle, which counteracts the pressure from within.

3. If this counterpressure is removed at any point by taking away a portion of the mantle, the increased internal pressure will overstretch and rupture the wall of the hollow body at this point.

The more or less distended bladder represents such a hollow body; about its equator the pelvis forms a rigid mantle, affording effective counterpressure, with the foramen obturatoria and ischiadica as the points of least resistance. Below, the bladder is supported by

the pelvic floor, with the rectum, vagina, and urethra as the points of least resistance.   Above, there are only the intestines, offering the least support of all, though the contunding object or the violently contracting muscles (in the case of the fifth group) may here act as a supporting mantle.   The force with which the contunding object strikes the bladder, the angle at which that force is applied, and the degree of distention of the bladder are all factors in determining, not only whether the bladder will rupture as a result of a given accident, but also in determining the site of the rupture.

1. If the internal pressure in a distended bladder is increased by the application of blunt force, the bladder wall will be overstretched and torn at that point which at the moment of the accident is protected by the least counterpressure.

2. In a much distended bladder, which rises above the symphysis, it is the superior and posterior parts of the bladder which are in greatest danger, because they have only the minimal support afforded by the intestines.   If the bladder tears at this point, the rupture is intraperitoneal.

3. With a lesser degree of distention, the application of force above the symphysis usually forces the bladder into the pelvis.   The contunding force is in itself a protection for the vertex of the bladder, owing to the pressure which it exerts at this point.   The portion of the bladder which is in greatest danger is that supported only by the yielding pelvic floor.   If the rupture occurs posteriorly, it may still be intraperitoneal, since the peritoneum extends far down on the posterior bladder wall; but, if the bladder ruptures anteriorly, the lesion is usually extraperitoneal.   The most common site of ruptures of the bladder is the posterior wall near the vertex, and intraperitoneal ruptures far outnumber the extraperitoneal. Thus Bartels collected 102 cases of intraperitoneal and only 62 extraperitoneal ruptures.

Predisposing Factors.—A glance through the recorded cases of rupture of the bladder shows that a very large majority of the victims are men in the prime of life, between the ages of 20 and 40; a much smaller number of cases concern children, and here traffic accidents are frequently recorded.   In only a little over 6 percent of these injuries are the victims women, but here, as in other traumatic lesions, the role of age and sex in determining the incidence of ruptures of the bladder is probably entirely one of occasion —it is the added hazard of the strenuous life of the male in the prime of life rather than any anatomical or pathological predisposition which results in this ratio of some 16 to 1.

But this preponderance of adult men is also closely connected with the two all-important predisposing factors—the almost essential distention of the bladder and the closely associated question of intoxication.   A certain degree of distention is to be assumed in

every, or in practically every, rupture of the bladder. In the intoxicated the kidneys are not only abnormally active, but there is a dulled perception, so that the distended bladder is not relieved as promptly as it would be in a less nebulous state of mind. The increased desire for personal combat engendered by indulgence in alcohol is also held accountable, though in a less degree, for the important role of alcoholism in bladder ruptures. Bartels recorded intoxication in 25 percent of his cases, Pleschner in 14 percent of his, though it was to be assumed, though not proved, in a much larger number. Dobrovolskaia, and Wiedemann, and Dobrauer found all their patients intoxicated. Another significant fact in this connection is the relatively high incidence of ruptures of the bladder in Russia, where alcoholism is very common. It is also significant that a large number of the cases of rupture of the bladder in women are reported from this same country, where intoxication is not considered strictly a masculine prerogative. Apropos of this question of national incidence, it is interesting to note that a heavy percentage of bladder ruptures has sometimes been ascribed to the American and English nations because of the Anglo-Saxon love of boxing.

A number of other conditions, having for the most part to do with pathological changes, may help to determine a rupture of the bladder, but they are of minimal importance as compared with the degree of distention. One group of predisposing factors is closely related to the latter—such are the pathological changes which interfere with the emptying of the bladder (enlargement of the prostate, stricture of the urethra, etc.)

A second group of changes affect the bladder wall itself. Here have been recorded lipomatosis or fatty degeneration of the muscles, their infiltration by a neoplastic growth, muscle degeneration due to frequent or habitual overdistention of the bladder, and suppurative or inflammatory processes having their origin in the uterus, the adnexa, the omentum, or the gut, and resulting in adhesions to the bladder. A cystitis of long standing, tuberculosis, or diverticula of the bladder have also sometimes been incriminated.

Morbid Anatomy.—In the most frequent type of rupture of the bladder all of its coats are torn, and the rent is a vertical one. In explanation of the latter fact it has been asserted that the weaker lateral muscle fibers are torn, while the stronger vertical fibers are separated only by the force applied. Some writers have thought they had found sufficient evidence to warrant the conclusion that the mucosa is first torn, then the muscularis and serosa; others would have us believe that this order is reversed; still others that the muscularis yields first, and only then its outer and inner coverings. With the evidence thus far presented, however, it seems wisest to leave the question undetermined, or to assume that now

one layer, now another, is the first to tear. At least we know that ruptures affecting only the mucosa have been reported in a number of instances, and, in view of the minimum disturbance created by such an injury and its benign course, it seems safe to assume that such partial ruptures are far more common than a perusal of the literature would suggest. As the cystoscope comes into more common use, these tears in the mucosa probably will be observed in increasing numbers. Partial ruptures of the bladder, involving only the muscularis or the serosa, are incomparably rarer, but at least one case of each has been reported.

In an unfortunately large number of cases the pathological picture presented at the time of operation is vastly different from the simple rupture which was the immediate result of the accident. A complete rupture of the bladder is almost instantly followed by the escape of urine. Where the rent is intraperitoneal, this means the very early development of peritonitis. At first this may be simply the reaction of the peritoneum to an irritating invasion, for the urine is often sterile; but the escaping urine, blending with the extravasated blood and the peritoneal exudate, forms an ideal culture medium for the organisms which sooner or later find their way to it, thanks to the offices of an inquisitive catheter in a large number of cases. The lips of the wound may become necrotic, and particularly in those cases in which the rupture was at first partial the escaping urine may have burrowed far into the bladder wall. Extraperitoneal ruptures of the bladder in particular are characterized by the destructive extravastion of urine, which is halted only by the surgeon, or by death.

In subcutaneous wounds of the bladder, resulting from the penetration of a fragment of bone from the fractured pelvis, undermining of tissues is apt to take a rapid course because of the more or less extensive laceration of the perivesical tissues. From the nature of the traumatizing agent it is readily understood that the subcutaneous wounds of the bladder have no characteristic form, no established line of cleavage.

Symptomatology.—*Shock* is recorded in most cases of rupture of the bladder, but its presence is to be attributed to the severe nature of the traumata which determine the bladder lesion rather than to the rupture proper. In other words, shock is to be referred to the insult to the abdomen rather than to the visceral injury, and it gradually subsides unless there is severe hemorrhage.

In most cases *hemorrhage* from the rupture of the bladder is relatively slight. The urine which is passed voluntarily, or, more frequently, obtained per catheter, is usually blood tinged, and may even appear to be pure blood. Even in those cases in which the urine appears entirely normal, Pleschner asserts that blood may be demonstrated microscopically. The site of the rupture rather than

its size determines the amount of hemorrhage; the posterior wall
of the bladder near its apex, most common site of a rupture, has
a comparatively poor blood supply, and hemorrhage from a rupture
here is seldom marked. Ruptures in the trigone bleed somewhat
more freely, but the contracture of the muscular walls has a ten-
dency to limit the hemorrhage from any wound in this viscus, so
that anemia is rarely recorded as a symptom of these ruptures,
and I have found no instance in which death was due to hemorrhage.

With the subsidence of shock, *pulse* and *temperature,* as a rule,
return to normal until the invasion of the peritoneal cavity or of
the perivesical tissues by the escaping urine results in the develop-
ment of peritonitis or phlegmon.

Rigidity of the Abdominal Muscles.—This is less frequent than
in ruptures of the gastrointestinal tract. In intraperitoneal rup-
tures the development of muscular rigidity at a later period usually
denotes the onset of peritonitis, as do nausea, vomiting, Hippocratic
facies, hiccoughs, a rising temperature and pulse rate.

Subjective Symptoms.—At the moment of the accident the victim
is sometimes conscious of a sudden yielding in the abdomen; with
no knowledge of the nature of the suspected injury, he states that
he felt something burst. Again he complains of having experienced
a sudden lancinating pain. Later on, the pain is usually dull in
character, a sense of tension and pressure, and is located in-
definitely as in the lower abdomen, or as localized behind the
symphysis. Occasionally it is said to be in one or the other of
the lower quadrants of the abdomen when it will usually be found
to correspond to a tear in the bladder wall on the same side.

More common, and more characteristic than this type of pain,
is a tormenting, frustraneous strangury, often, though inaccurately,
termed "bloody anuria." There is a constant painful desire to
urinate, but the patient is unable to void, or passes only a few
drops of blood. In the exceptional case the patient may void appa-
rently normal urine, and strangury does not develop until later.

Objective Symptoms.—The objective symptoms also have to do
with the functional disturbances of the bladder. The patient states
that he has not urinated since some time previous to the accident,
yet on examination it is impossible to locate the area of bladder
dullness. After a certain interval, iliac dullness, or a diffuse area
of dullness, may be found instead. The patient's statement that
he has not urinated for some hours, and is suffering from a tor-
menting desire to void, leads all too naturally to the early employ-
ment of the catheter, and with the catheter a variety of symptoms
are elicited. Although it may have been some hours since the blad-
der was emptied, only a minimal quantity of blood-stained urine
may be drawn off; or the catheter may by chance be passed through
the rent in the bladder wall, and a large quantity of urine be ob-

tained, so far exceeding the normal bladder capacity as to suggest at once that the peritoneal cavity has been catheterized. The presence of an abnormally high percentage of albumin in the urine obtained indicates its admixture with peritoneal exudate.

Diagnosis.—For the purpose of diagnosis the symptoms of rupture of the bladder are sometimes divided into two groups: 1, those of the first 24 hours—i. e., those arising from the bladder; 2, those developing after the first day—i. e., the symptoms of peritonitis. It is hardly necessary to point out that in practice no such definite line can be drawn; immediately following the injury the symptoms directly referable to the bladder may be more or less masked by the general reaction to the abdominal insult; symptoms of peritoneal irritation may develop early or may be long delayed. Yet, even so, this division is a useful one.

After the subsidence of shock a thoughtful consideration of the symptoms of disturbed bladder function make possible a tentative diagnosis in most cases, and in the presence of strangury, particularly when accompanied by abdominal rigidity and pain and tenderness over the lower abdomen, expectant treatment is little short of malpractice.

Because of the impossibility of freeing the urethra of organisms, sterile catheterization can never be assured. The normal bladder can take care of this contamination; not so the ruptured bladder, and the introduction of infection here means the early onset of peritonitis. The use of the catheter in the presence of a suspected rupture of the bladder is accordingly most inadvisable. Catheterization, however, has often been performed with the idea that the patient is suffering from nervous retention, or with no idea at all beyond that of making the patient comfortable. If the catheter has been used, and confirmatory evidence of a ruptured bladder found, immediate operation is imperative. Filling the bladder with some antiseptic fluid, usually boric acid, to determine whether the entire amount of fluid returns, and distending the bladder with gas or air to test the continuity of its walls, have frequently been employed as diagnostic aids. Both bring the hazard of making an incomplete rupture complete, and both increase the danger of peritoneal infection. This element of danger robs them of the diagnostic worth which they would otherwise possess.

The Differentiation of Extraperitoneal and Intraperitoneal Ruptures of the Bladder.—This is usually uncertain, often impossible. A dull area over the symphysis, or spreading wing-shaped outward and upward, denotes an extraperitoneal rupture. Free fluid in the abdominal cavity, disclosed by percussion, vaginal or rectal examination, signifies an intraperitoneal rent. If very large or very small quantities of urine have been withdrawn per catheter, the tear is probably intraperitoneal; a normal quantity of urine speaks

for an extraperitoneal rupture. With an intraperitoneal tear the bladder is commonly collapsed and the catheter may find its way through the rent without much effort on the part of the physician; it is less apt to pass through the extraperitoneal tear, but it may do so, and its tip may then be felt through the abdominal wall. In a general way it may be said that hemorrhage from a tear high in the bladder is usually less than from a tear in its fundus, so that profuse hemorrhage, the blood that is withdrawn containing but little urine, might speak for an extraperitoneal tear, but the size and character of the wound are only two of several factors which go to modify this statement and rob it of much of its value. In a case reported by Della Torre a catheter inserted deep into the bladder withdrew urine which was but slightly blood tinged; when only the tip of the catheter was inserted, almost pure blood escaped. At operation an extraperitoneal rupture of the bladder was found very near to the internal meatus.

Complications.—Ruptures of the bladder—strangely enough in view of the severe accidents which determine them—usually occur as isolated injuries in so far as the peritoneal cavity is concerned. Fractures of the pelvis are present in a fairly large percentage of cases, since they are the direct cause of subcutaneous wounds of the bladder. Other fractures are also frequently noted, while wounds of the fleshy parts are rare; concomitant injuries to the urethra in particular are conspicuous by their rarity. If the term complications is understood to include the remote results of an injury, peritonitis and phlegmon, in intraperitoneal and extraperitoneal ruptures respectively, are the inevitable complications in every case not submitted to early operation. Uremic poisoning from the absorption of large quantities of urine is often observed in those patients who do not fall early victim to the peritoneal infection.

The *prognosis* in ruptures of the bladder depends on timely therapy. Hippocrates branded all injuries to the bladder as fatal, and the writers even of modern times have subscribed to his teachings. Though recoveries from penetrating wounds of the bladder, where the traumatizing agent might chance to apply the first principle of therapy—drainage—undoubtedly did occur, there was little cause to dispute his statement in so far as the subcutaneous, intraperitoneal ruptures were concerned. The rare instances in which spontaneous recoveries were recorded are to be set down as cases of mistaken diagnosis, or as miracles, but not as precedents. The prognosis in extraperitoneal ruptures was better. Thus, in Bartels' early statistics, 93 of 94 patients with intraperitoneal ruptures succumbed, and only 46 of the 63 with extraperitoneal ruptures. As operative therapy has gained ground, there has been a corresponding fall in the death rate. In the last years of the nineteenth cen-

tury, operation came to be the recognized treatment. According to Goldenburg, the mortality in ruptures of the bladder prior to 1895 was 45.5 percent; in the succeeding ten years it fell to 20.5 percent, or less than half the earlier death toll. Jones' statistics are parallel—in 32 cases reported prior to 1893 the mortality was 63.5 percent; in 22 cases recorded in the succeeding ten years it was only 27.5 percent.

The influence of the time factor on prognosis is as graphically illustrated by a comparison of mortality rates. Galaktionow reports on a series of 15 intraperitoneal ruptures of the bladder operated upon in the Obuchow Hospital during a ten-year period. The mortality was 66 2/3 percent, the poor results of operation being directly attributable to the tardiness with which the patients entered the hospital. Of the 5 cases that recovered, 3 were operated upon within the first 24 hours, 1 in 36 hours, and 1 after 80 hours. In the 10 fatal cases the average interval was 57 hours. Le Sieur reports that of 13 patients operated upon within the first twelve hours, 8 recovered, a mortality of 38 percent, while of the 10 patients operated upon in the next twelve-hour period only 3 recovered, a 70 percent mortality.

In view of this evidence there need be no discussion as to which patients are to be operated upon or when. Every rupture of the bladder should be submitted to operation and at once.

Operation.—The object of operation is twofold—the restoration of the continuity of the bladder by closure of the rent, and relief from the danger, existing and threatened, of the invasion of the peritoneal cavity and the perivesical and paravesical tissues by the escaping urine. Where a definite diagnosis of intraperitoneal injury has been made, these ends can best be obtained by laparotomy; in the known presence of an extraperitoneal rupture by *sectio alto*. In a large number of cases, particularly those which are so fortunate as to come up for operation very soon after the injury, a definite diagnosis of the site of the injury cannot be made even by catheterization immediately before operation. Here exploratory laparotomy and primary *sectio alta* have contended for honors. Against *sectio alta* there is urged the inadvisability of determining a second wound of the bladder, unnecessary if the injury should prove to be intraperitoneal. Laparotomy has the great disadvantage of exposing the peritoneal cavity to infection, unnecessarily if the rupture is extraperitoneal, and of lessening its resistance if infection should occur. If the term *sectio alta* be used in a somewhat modified sense, to signify a suprapubic incision down to the bladder, and the exploration of the space of Retzius, diagnosis can in most cases be made with a very fair degree of certainty, and the bladder then be opened, or the incision enlarged for laparotomy, as the case demands. Such a procedure has the added virtue of enabling the

operator to detect the coexistence of an extraperitoneal and an intraperitoneal rupture.

When the abdomen has been opened, the free fluid, urine, blood, and exudate, is removed as completely as possible with dry sponges. The viscera are inspected and the abdominal cavity walled off; a careful search is made for the rupture, which must be closed in two layers, the first suture row including muscularis and serosa, and the second the serosa only. In those cases in which the primary destruction of tissue or subsequent necrosis has made it impossible to secure an impermeable suture line, the latter may be protected by a free omental patch. After completing the peritoneal toilet and restoring the continuity of the bladder walls, the ideal conclusion of the operation is the closure of the peritoneal cavity. This is not always a practical procedure, however, for the question of drainage must here be decided on the same principles as in other abdominal operations. The use of gauze packing in contact with an insecure suture line is to be avoided because of the possibility of injury at the time of its removal; a rubber tube will here do better service.

The extraperitoneal rupture is closed by suturing first muscularis and serosa, then serosa only, no stitches being allowed to penetrate the mucosa. Where suture is impossible, the wound is packed and drained, insuring recovery in a large percentage of cases, but only after a tedious convalescence. The space of Retzius should be well drained in all events, and, where there has been infiltration with urine, the infiltrated area must be laid open, the incision extending well beyond the infiltrated area into normal tissue. This thorough exposure of the phlegmonous region is so important that the watchword should be, "rather too many incisions than too few."

Rest for the bladder should be insured by the use of a retention catheter. This end may be even more effectively obtained by introducing a tube into the bladder through a corner of the suprapubic cystotomy wound; the extent of the injury and the individual preference of the operator will decide which of the two procedures is to be employed.

After operation the patient should be placed in the Fowler position, and continuous proctoclysis instituted for the first twenty-four hours at least, often longer. The urine should be kept acid to guard against cystitis in so far as possible. The retention catheter may usually be removed by the third day, and the patient catheterized at two-hour intervals if he is unable to void spontaneously. The usual precautions against cardiac and pulmonary complications are to be employed.

A CASE OF CHRONIC FIBROID PNEUMONITIS, INVOLVING PERICARDIUM AND GREAT VESSELS.

By JOHN B. HAWES, 2d, M.D., Boston.

I am presenting the following case in considerable detail because it presents a problem in differential diagnosis, involving conditions with which the general practitioner as well as the specialist in lungs frequently meets and frequently finds most baffling.

On July 31, 1917, I was asked to see Mr. G. W. L., a married man aged 33, a banker by occupation. His family history was excellent in every way. His habits were of the best, and he denied venereal infection absolutely. This statement I have every reason to believe to be true. Aside from the ordinary children's diseases, he considered himself a robust and strong man. He has never had any serious illness up to the present time; average weight for the past ten years has been from 150 to 160 pounds. He usually loses 8 to 10 pounds during the summer months.

In June, 1916, Dr. Charles O. Day, of Hingham, his family physician, had attended him for what was called gout. Gout, the patient told me, was somewhat of a family characteristic. This attack, consisting of swelling of the great toe joint, was relieved by colchicum and subsided in a short time. In September, 1916, he was taken with what appeared to be acute bronchitis, associated with shortness of breath. At this time Dr. Day found some dullness in the left side of the chest toward the base, with rales. He was seen in consultation by another Boston physician, who said that he did not have tuberculosis. As a routine measure a Wassermann was taken, which was said to have been mildly positive. The patient was then put on mixed treatment for two or three weeks, under Dr. Day's supervision, without any result. In December, 1916, Dr. Harold Walker, of Boston, operated on his nose, which had been broken many years before, with a consequent obstruction and great difficulty in breathing. He did not get much relief from his nasal symptoms, however, until the late spring of 1917. Although the shortness of breath which had characterized his attack of bronchitis in the fall still continued, he kept at his work. A month ago he built a sleeping porch, and has been sleeping out of doors ever since. Up to this time the striking symptom in this case has been shortness of breath, which still persists. According to Dr. Day, rales at the base of the left lung behind were still present.

Late in June, 1917, the patient was sent by Dr. Day to the con-

sultation clinic of the Massachusetts General Hospital. Here, after careful examination, including two negative Wassermanns and an x-ray taken of the chest, diagnosis of malignant disease of the lung was made. This was based on the fact that the Wassermanns were negative and that the x-ray showed a fairly definite process at the root of the lungs. At the present time he sleeps well, eats as usual, has no cough or pain in his chest, his only complaint being shortness of breath and a sense of fullness in the left flank under the ribs.

My examination was as follows: A man 6 feet in height, of a spare and rangy type, not confined to the bed. There was marked cyanosis of the face and hands; temperature, 97; pulse, 130; weight, 150; blood, normal; blood pressure, 140 systolic; urine showed a slight trace of albumin, but no sugar, casts, blood, or other abnormal constituents. Pupils and other reactions were normal. The heart was apparently normal in size, position, and, except for the rapidity of action, showed nothing remarkable. The lungs showed dullness over the lower half of the left back with moderate bronchial breathing. No rales were heard. The rest of the examination at this time was negative.

At this time my diagnoses, in order of probability, were: 1, malignant disease of the lung; 2, pulmonary syphilis; 3, pulmonary tuberculosis. I have seen him practically once a month up to the present time. Up to January, 1918, he gained in weight slowly from 150 to 162 pounds. This, perhaps, is to be largely accounted for by the fact that I put him to bed and kept him nearly at absolute rest. Despite the last two negative Wassermanns, I have had two injections of salvarsan given without any result, beneficial or otherwise. Each time I have seen him the temperature has been subnormal, and the pulse 120 to 130, with the cyanosis practically as before. In June, 1918, there was a distinct mass to be felt under the ribs on the left, undoubtedly the spleen, while a definite enlargement of the liver was likewise present. The enlargement of liver and spleen I take to be due to chronic passive congestion. At this time I asked Dr. W. H. Smith, of Boston, to see the patient in consultation. In my own mind I had ruled out malignant disease, syphilis, and tuberculosis as the cause of his symptoms, and had come to the somewhat unsatisfactory diagnosis of a fibroid process at the root of the lung, involving the great vessels and perhaps the heart. Dr. Smith confirmed my opinion that malignant disease, tuberculosis, and syphilis could be ruled out. He was of the opinion, however, that the condition was more cardiac than pulmonary, and advised digitalis. Accordingly I gave digitalis in moderate doses, and am still continuing it, although I frankly am unable to see that it has any particular effect.

In many ways the patient is in distinctly better condition than he was nearly a year and a half ago, when I first saw him. His

weight has gone down, but his ability to do things, such as walking up and down stairs, etc., has improved. His color, the rapidity of the pulse, and the signs in his lungs remain about the same.

The x-ray examination of July, 1917, as compared with a similar examination of July, 1918, shows practically the same condition—i. e., a fibroid process around the root of the lung as follows: "there is an extensive process in both lungs, which is characterized by fine mottled dullness, most marked at the roots, and extending downward along the lung markings, reaching well into the periphery of the lung in the axillary borders; the bases and apices are apparently not involved." The heart is apparently considerably enlarged at the present time as compared with its size of a year ago. Such an enlargement would be the natural result of the evident cardiac embarrassment and is a favorable sign rather than otherwise.

While the diagnosis in this case is not a definite one, there are certain conditions which I feel can be definitely ruled out. I will consider these in order.

Pulmonary Tuberculosis.—Tuberculosis would be the first thing that would occur to anyone. The patient is taken with what is apparently bronchitis, with the difference that the constitutional signs and symptoms are more marked than is the case in ordinary acute bronchitis. Loss of weight, loss of strength, shortness of breath, dullness, and rales in the lungs are all suggestive of a tuberculous process. The fact that there is no temperature does not necessarily militate against this diagnosis. Both the clinical evidence and the x-ray evidence, however, show that the process apparently commences and is largely confined to the root of the lung, which is strong evidence against tuberculosis. Frequent sputum examinations have been invariably negative, which is, of course, confirmatory evidence. Extreme cyanosis is unusual in a tuberculous condition. A tuberculin test, which I purposely did not advise, would have given very little evidence one way or the other. The fact that the disease has at no time extended to the apices, and that the signs in the lungs have not increased nor subsided, is evidence against tuberculosis. For these reasons I feel that this can be eliminated.

Pulmonary Syphilis.—In many ways this condition is strongly suggestive of a luetic infection of the lungs. The fact that a syphilitic infection was denied, that there was no evidence of any hereditary taint, is not necessarily good ground for excluding syphilis. There were two faintly positive Wassermanns and two definitely negative ones. The chief factor in ruling out syphilis, however, is the fact that there has been no improvement under mercury and the iodides given in 1916 or salvarsan given intravenously in 1917. It is hard to conceive of any process in the lungs due to

syphils which did not show definite changes sooner or later under antiluetic treatment. The diagnosis of pulmonary syphilis is, at best, one of exclusion. Very few cases are diagnosed on clinical evidence alone. The five points on which the diagnosis of pulmonary syphilis might be based are as follows: 1, the site of the lesion— i. e., at the root of the lung, and practically never at the apices and rarely at the base; 2, the presence of syphilis, past or present, elsewhere in the body; 3, positive Wassermann reaction; 4, sputum persistently negative for tuberculosis; 5, improvement under anti- luetic treatment. The symptoms suggesting syphilis rather than tuberculosis are: 1, shortness of breath; 2, absence of temperature; 3, rapid pulse. It is to be noted that each of these symptoms is present to a marked degree in this case. The diagnosis is excluded, therefore, almost entirely on the failure to improve under antiluetic treatment given persistently and carefully.

Malignant Disease of the Lung.—Malignant disease of the lung was a perfectly justifiable diagnosis, and almost the only logical diagnosis at first. This was the diagnosis made by Dr. F. T. Lord, who saw the patient in June, 1917, at the consultation clinic at the Massachusetts General Hospital. While I naturally said nothing to the patient concerning this, I told his family that this was the most probable explanation of his symptoms. As month after month went by, and the patient, instead of growing worse, gradually improved, such a diagnosis became more and more doubtful; at the present time, over two years after the first onset of symptoms, I feel that it, of course, can be ruled out. The fact that two x-ray examinations made a year apart showed practically the same condition as far as the lung is concerned is in itself sufficient to exclude malignant disease. While I do not feel that the outlook in this instance is any too good even at the best, I am naturally distinctly pleased that any such condition as malignant disease of the lung need no longer be considered.

Pulmonary Fibrosis, Interstitial Pneumonia, Cirrhosis of the Lungs.—This condition, as stated by Morris and Lander, "prop- erly speaking, is not a disease, but it is simply the result of some previous infection. While the etiological and pathological features of pulmonary fibrosis are extremely varied, the clinical picture is fairly characteristic. It is for this reason that cases of this nature are grouped together." Some such condition as this is my final diagnosis of the patient's case. Owing to some previous pulmonary infection, the exact nature of which is unknown, a fibroid process has developed at the root of the lung, chiefly on the left, which process now involves the great vessels and the pericardium. At the present time this is apparently quiescent. It has not been affected by antiluetic medication; it has not advanced as would be the case in malignant disease; it has not shown the clinical signs

and symptoms of tuberculosis. Had he been engaged in some trade or occupation whereby he was exposed over a considerable period of time to dust in any form, we would consider the general subject of pneumoconiosis. As such is not the case, this condition need not be considered.

Dr. W. H. Smith, in June, 1918, saw the patient, and he believes that the condition is primarily cardiac and not pulmonary; and would explain not only the enlargement of spleen and liver, which it may be taken for granted are due to chronic passive congestion, but the changes in the lungs as well, by this same cause. Fibroid changes in the lung, however, due to chronic passive condition, and known as "Brown's induration," are extremely rare. To me it seems more logical to consider the cardiac condition as secondary to the pulmonary process.

Treatment in this case has been largely symptomatic. Iodides, mercury compounds, etc., have been tried and given up. I have kept him on small amounts of digitalis for the past six months, and shall continue to do so in the future, but I am free to admit that I can see very little effect which I can attribute to this. Rest has been the primary factor in the slight but definite improvement that he has made during the past year or more. I have allowed exercise in the way of walking or driving in only very moderate amount.

My ideas as to prognosis in this case are, at the best, of the vaguest. He is at present in an almost stationary condition. From month to month I can see very little change, and it is only by comparing his present condition with that of a year ago that both he and I can see a definite improvement. Any intercurrent infection, I feel sure, would play havoc. As he lives a carefully regulated and guarded life, I see no reason for fearing any such mishap.

It has been a source of satisfaction, both to him and to me, that any form of malignant disease can be excluded. I now feel relieved that both to him and to his family I have been frank as to my own ignorance of the exact condition, and likewise that my attitude throughout has been that of an optimist.

DIAGNOSTIC DEMONSTRATION OF SPIROCHAETA PALLIDA.

By HERMAN GOODMAN, B.S., M.D.,

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It is a modern, well-recognized precept that the fate of the syphilitic depends on early diagnosis and effective early treatment. The demonstration of the offending organism is proof positive of syphilis, and many nonspecific appearing lesions, both genital and extragenital, harbor this spiral parasite. Syphilis in the chancre stage, prior to the wide dissemination of the germ, may be treated with promise of complete eradication of the disease.

The method of choice for the diagnostic demonstration of *Spirochaeta pallida* is by dark field illumination. The requisites for the utilization of this method are: the dark field apparatus, microscope with oil immersion and the essential "funnel stop," source of light, slides, cover slips, and immersion oil.

DARK FIELD APPARATUS.

There are two main types of apparatus in use—the plate and the substage. To use the plate type of instrument, the microscope is stripped of its condenser and the stage left perfectly free both above and below. In the use of the substage instrument the ordinary Abbé illuminator is removed and the dark field condenser is substituted. It is necessary to manipulate the upper portion until the top of the condenser is flush with the upper surface of the stage. Both types must now be centered. This means that the center of the dark field is exactly in the middle of the field. To accomplish this, the procedure with each instrument is slightly different. The low power objective is swung into place, and the plate instrument manipulated so that the inscribed circle on its surface is in the center of the field. It is wise to have several slide clips on hand, so that, once this centering is done, the plate can be clamped in place. If the microscope can be reserved for dark field work alone, it is a good plan to have it permanently screwed on the stage of the microscope. Centering of the substage instrument is done by means of screws in the condenser, the circle being sent into different positions according as one or another of these screws is turned. Once centered, this type of instrument rarely requires further attention to this important detail. The dark field instruments formerly secured from Europe had one feature lacking in all the American made. This is the double circle, which made accu-

rate centering a little easier because the outer of the two inscribed circles exactly fitted the field of the low power objective used in the manipulations.

To meet the physical requirements for a dark field, one must have inside the oil immersion objective a "funnel stop" to cut off all except the central rays. The insertion of the device does not interfere with the use of the oil immersion objective for other work.

A POWERFUL SOURCE OF LIGHT.

The miniature arc light has in the past been the prime favorite in dark field work, but with the advent of the tungsten nitrogen bulbs it is gradually falling into second place. The modern powerful bulbs inside any good reflector give ideal light. The radio lamp of Leitz is most acceptable. The room should preferably be dark during the search for spirochetas. Arrange the light—the mirror of the microscope, using the plane mirror always—in such a way that the circles of which we spoke above are seen as circles of light in the middle of a black field. It may be necessary to experiment a little to get complete satisfaction, but it is better to spend a few extra minutes getting ready than to waste many more attempting to work against unfavorable conditions.

PREPARATION OF MATERIAL.

Of prime importance is the knowledge that the recent use of antiseptics, such as calomel ointment or dressings of bichloride, make the successful hunt for *Spirochaeta pallida* extremely difficult. Any lesion to which powerful antiseptics have been applied should first be given wet saline dressings for from four to twenty-four hours. Remember, also, that you are handling a lesion rife with infectious possibilities, so wear gloves, and destroy any gauze or cotton that comes in contact with the patient.

Wipe the surface of the lesion with a cotton sponge, using a little pressure. This removes the superficial epidermal debris and many confusing saprophytic spiral organisms. Rub the denuded surface briskly or tease it with a needle, scalpel, or other instrument very lightly, being careful not to get any appreciable bleeding. Squeezing the lesion between two fingers after surface cleansing may furnish sufficient serum without having recourse to any of the above aids. As soon as enough serum collects on the surface of the lesion, transfer either to the slide or cover slip, directly or by a platinum loop. Use only thin slides and slips that are new and free from any scratch marks. Perfectly clean slides and slips are a source of considerable satisfaction. Have a drop of immersion oil both on the under surface of the slide and on the upper surface of the cover slip. This insures a continuous airless medium from dark field to objective.

Lower the oil immersion objective into the oil, almost touching the cover slip. Do not have it touch, because, if the serum is scanty and the oil thick, you are likely to raise the cover slip from the slide. Focus with the fine adjustment until you see the dark background, in which glistening dancing particles move among perfect white rings of light. The small particles are minute ultramicroscope organisms and colloidal bodies of the blood serum. The rings are the outlines of red blood cells. When this field has been obtained, search for the gleaming, twisting spirochetes.

Any recent text-book gives the classical data for the differential diagnosis of *pallida* from other spiral organisms with which this pathogenic form is likely to be confused. A few observations of a practical nature, however, may not be amiss. The *Spirochaeta pallida* is variously reported as being as long, or twice as long, as the diameter of a red blood cell—that is, either seven or fifteen microns. The number of spirals is given from eight to twenty-four. The best explanation for this disparity of figures is that the organism has been observed while in its single, double, or even giant form. The single *Spirochaeta pallida* is about seven microns long, has eight spirals, is exceedingly thin, and is straight, with a regularity of turn that makes it seem possible to run a ramrod through its long cylindrical center. The motions of the *Spirochaeta pallida* are many. The first is a spiral or corkscrew or "bit" motion on its longitudinal axis. This motion is very regular, and the spirals are all kept in the same line. The second motion is forward and backward in the serum, staying in a quiet field for a long time. This motion is in a straight line, there being no inclination of the body of the organism. A third motion is a rising and sinking one, making it essential to keep focusing with the fine adjustment if one wishes to keep any spirocheta in sight during its excursions. The complacency of the organism is so marked that it leaves not a ripple behind as it travels through its fluid medium. It is not possible with the dark field to recognize either the terminating flagella or the controversial undulating membrane.

The double length forms are interesting from the biological standpoint, since they may be dividing forms which have not yet completed their division. Whether the line of cleavage is longitudinal or the organism first increases the number of its spirals and then divides in the middle is unsettled. "Y" forms and "V" forms are seen in both the dark field and in stained specimens, which lend credence to either theory. Along what one can imagine the division line will ultimately be (although many hours' observation of the same organism have never resulted in seeing one of these double forms actually form two) there is unusual activity. Both halves wriggle, twist, and squirm as if in a tremendous effort to rid itself of its twin. The free ends fling widely about and the organism may

double back on itself in a number of forms. Some observers claim that the "Y" and "V" forms are always the result of this activity rather than a demonstration of division. Very rarely this unusual activity may cause the free ends of the spirocheta to entwine in some such manner as the snake is reputed to take—its tail in its mouth and form a loop. I have seen this form but once.

Triple forms and giant forms are multiplications of this process and are uncommon. Throughout the multiple changes enumerated above, the organism retains the constancy of regularity of coil, except at the points of junction.

Thick, medium, and thin forms of the *Spirochaeta pallida* have been described. My own observations on this have not been completed, but my impression is that the organism changes with the age of the lesion which harbors it. Casual reference to the life history of the paramecium, with its wonder story of conjugation and regeneration of youth, may make one speculate as to the pseudo-sexual character of this evident entwining and reduplication of forms. The novel sexual and asexual cycles of McDonagh are fascinating, but the work of this author has not been held in as good repute as it might. His book is well worth studying, but only a genius in chemistry, physics, bacteriology, and pathology can review it understandingly.

There are several common types of spirochetas likely to be confused with the *Spirochaeta pallida*. In smears made from genital lesions the usual contaminator is the *Spirochaeta refringens*. This organism is easily differentiated. It is usually coarse, has a lesser number of spirals, the spirals are not regular, seldom of the same depth, and almost always one or more spirals are progressing out of tune with the others, giving a staircase effect to some portion of the organism. *Spirochaeta refringens* is often found associated with the pathogenic *pallida,* but mainly when taken from the superficial parts of the syphilitic lesion. This association has given rise to one theory of the origin of syphilis as a pathogenic mutation of the harmless refringens.

Smears from the mouth are contaminated with the *Spirochaeta macrodentium, microdentium,* and *buccalis.* There is no difficulty in distinguising the coarse *macrodentium,* with its smaller number of thick-set spirals, from the delicate *pallida,* but the two last named may give some trouble unless one possesses an intimate knowledge of the behavior of the offending organism. The *microdentium* and *buccalis* are both as fine an organism as the pallida, but they move differently, have not the same form maintained throughout their course, change character when at rest, and are likely to have one or more uneven spirals along their course. A study of the usual spiral flora of the mouth will be well repaid by the wealth of information acquired. Tooth cavities and the space about the roots

of teeth are the incubators for this type of bacteriological investigation. It will be surprising to most to have revealed an indefinite number of organisms even in the most cleanly kept buccal cavity.

The *Spirochaeta pertenuis* of Castellani or the *Spirochaeta* of yaws is morphologically indistinguishable from the *Spirochaeta pallida*. This organism will hardly be met with in this country except in new comers from tropical countries.

Early in this paper we stated that the demonstration of the *Spirochaeta pallida* was proof positive of the existence of the syphilitic infection. Does the absence of this organism in one or more specimens searched exclude the diagnosis of luetic chancre? Hardly. Many typical chancres give hours of fruitless labor in the attempt to demonstrate the offending but baffling spiral. If a lesion is clinically sufficiently suspicious to warrant the hunt for the *Spirochaeta pallida,* the nondemonstration should not give the patient a clear bill of health. Repeated searches should be undertaken, the local applications being of a cleansing nature only. The Wassermann test should be taken at weekly intervals for at least seven weeks, and, if only even slightly positive from reports of a well-controlled laboratory, treatment should be instituted. The clinical evidence of four hundred years' study of this disease should not be cast adrift in the face of the newer discoveries, and clinical chancres are still chancres. It is wellnigh criminal to wait for the secondary manifestations, since even with the most persistent treatment begun at this period the chances of cure are many, many times diminished.

Should we, on the other hand, treat every herpetic vesicle or lichen papule on the glands as syphilitic? Would it not be better to give a course of salvarsan and assure the suspect that now he is safe? Again the answer is, "Hardly." But any patient with a lesion that the mature examiner declares is a primary lesion of syphilis should be treated intensively, whether the dark field illumination revealed the *Spirochaeta pallida* or not. Its demonstration is of value. It makes an absolute diagnosis, and is confirmatory to clinical judgment and knowledge. It has taught us that many erosions and socalled soft chancres harbor this scourge of the race. The method should be used often—it should be used universally.

Before closing, condemning testimony must be given against the easier Burri india ink method of demonstrating spirocheta.

The objections are numerous. Among others, mention is made of the greater difficulty of finding even a well-made smear a still object as compared to a motile one. In cases where the lesion has few spirochetas the india ink method is far inferior. The making of the smear and changes in osmotic pressure so contorts the spirals that the task of differentiation of pathogenic and nonpathogenic spiral organism is increased. At this time the impossibility of

securing the foreign Chin-Chin puts this method beyond the pale of good usage; the only substitute, a commercial india ink, already contains spiral organisms or spiral-like artefacts.

Other staining methods are open to the same objections as the above, excepting the prior presence of some spiral forms, although the precipitated stain does take some astonishing confusing spiral-like forms.

Cultural and animal inoculation are not practical diagnostic methods and will not be dilated upon here.

The staining for *Spirochaeta pallida* in sections is a good method, but it requires the excision of a portion of the suspected lesion, and at least a week's delay for the report. The Levaditi method is the one ordinarily employed. The study of the morphology of the *Spirochaeta pallida* in a stained section of a chancre will reveal many of the forms discussed above. The size of the organism in the stained smear and in the dark field is slightly different due to the fact that the stained spirocheta is visible to the eye as the acquired stain, while the dark field gives the eye an image of the refracted light from the surface of the spirocheta. The dark field image can be compared with the crescent of a quarter moon which can be seen to cap the darkened lunar globe.

THE REMOTE RESULT OF TONSILLECTOMY IN THE YOUNG CHILD.

By JOHN ZAHORSKY, M.D., St. Louis.

The immediate result of the removal of the tonsils and adenoid vegetations is often gratifying. First, the improvement in respiration leads to an increased oxygenation of the blood. Second, the removal of a large infected focus permits the body to use its defensive forces to greater advantage on smaller foci. The child often acquires a better appetite, feels stronger, and gains in weight. A subacute catarrh of the nose and throat may improve very much; a persistent otitis media may rapidly heal. These favorable effects are noted by all rhinologists, and the benefit derived from the operation has been magnified until even the layman has caught the contagion.

It is not enough, however, to judge by the immediate results. Not sufficient studies of the remote results of tonsillectomy have been made, and this problem must be solved by the pediatrist and not by the rhinologist.

In this paper are offered a summary of the clinical observation of 150 children, aged 2 to 12 years, who were seen in private practice. I tried to ascertain, in the study of these cases, what effect the removal of the tonsils and adenoid vegetations had on the nutrition and health of the child six months to five years after the operation. Nearly all of these children were operated upon by competent surgeons.

The Nose.—Deficient nasal respiration was observed in 38 cases. It is remarkable to find a large number of cases of suppurative rhinitis follow the operation of adenoid removal in the young child. This is probably due to sinus disease existing before, but not manifesting itself until after the operation. A peculiar turgescence of the turbinate bodies, like an edema, was present very frequently even in older children. Does this phenomenon suggest that the removal of the faucial and pharyngeal tonsils in some way interferes with the lymph circulation?

The Ears.—Acute catarrhal and suppurative otitis media was found to occur in 21 cases. This suggests that, while the removal of infected tonsils may aid the cure of a persistent otitis, the removal of the pharyngeal tonsil does not prevent middle ear disease.

The Larynx.—Several cases of spasmodic croup occurred in this series. While the improvement in nasal respiration should diminish the probability of laryngeal infections, the acute susceptibility of many children to laryngitis remains unchanged.

The Bronchial Tubes.—Acute bronchitis is the most common respiratory disease in children, even when the tonsils and adenoid vegetations have not been removed. Of the 150 children, 49 had one or more attacks of bronchial inflammation within four years after the operation. The predisposition to bronchial inflammation was not changed in a single child under 8 years of age.

The Lungs.—The remarkable finding in this study was that so many young children had one or more attacks of pneumonia within the three years following the operation. Undoubted pneumonia (lobar and lobular) occurred in 15 children. In addition, about 22 cases of bronchiolitis were diagnosticated. Nine of these children had pneumonia the winter following tonsillectomy. The clinical impression that tonsillectomy increases the tendency to bronchial and pulmonary infection is corroborated by these figures, although they are not conclusive, as no figures are available as to the usual incidence of acute bronchopneumonia in children. That an attack of acute tonsillitis renders the child temporarily immune to a variety of dangerous infections seems probable.

Asthma.—Sixteen cases of asthma were found in this series. In one child the asthmatic paroxysms ceased for several years. A few others had a temporary improvement. All but this one had one to several asthmatic attacks during the following years. Apparently adenoid and tonsil operations have no special influence on the asthmatic tendency.

Rheumatism and Endocarditis.—Eleven cases of rheumatic fever were found in this series. Seven cases of endocarditis, 5 with a permanent valvular lesion, were observed. This teaches that heart lesions are by no means prevented by tonsillectomy. One girl had her tonsils and adenoids removed after the first attack of endocarditis; nevertheless she acquired a second severe attack two years later.

Chorea.—Six cases of chorea were observed, 3 of which followed within two years after the removal of adenoid vegetation, and 3 cases after the extirpation of both tonsils and adenoids.

Diphtheria.—I have observed 3 cases of diphtheria in children who have had a thorough removal of tonsils and adenoids.

Adenopathy.—While the removal of infected adenoids or tonsils often causes a persistent glandular disease of the neck to disappear, this by no means prevents the occurrence of adenopathy later. In 15 cases, 1 or more cervical lymph nodes became sufficiently enlarged to demand treatment.

Malnutrition.—"The child has never been well since he has had his tonsils removed." This statement was volunteered by several mothers. At any rate, we found a large number of cases of nervous anorexia, defective growth, and slow bodily development. Some of these clearly were instances of chronic malnutrition, in which

a tonsillectomy was done with the hope of improving the nutritional state, but without result. Some had recurrent bronchitis or asthma which retarded growth; others poor nasal breathing; some a post-pharyngeal catarrh; some decayed teeth, etc. The fact remains that so many of these children are insufficiently developed, and we cannot depend on tonsillectomy alone, as a rule, to improve nutritive condition. In this series only about one-third of the children showed permanent improvement.

The pediatrist has given too little attention to the development of immunity in the child. Not only must the physician advise concerning food, growth, and functional development, but he must also direct the child's care in such a manner that the child becomes immune to common diseases. The problem is not so much to prevent disease as to make the child so vigorous that he will resist disease. But the vigor produced by good nutrition is not sufficient; there must be added to his blood and tissue specific antibodies. In the majority of instances, in order to acquire these antibodies, it is necessary to have one or more attacks of the disease. To be immune to measles, the child must have had measles. To be immune to typhoid fever, the child must have typhoid fever or be artificially vaccinated.

True, there are numerous children who are naturally immune, who have inherited from their ancestors sufficient antibacterial substances so that they remain always relatively free from infectious diseases. These are fortunate children, indeed, but unfortunately their number is small.

This problem of immunization begins at once after birth. There are a variety of intestinal bacteria, putrefactive and fermentative microrganisms, which the infant must learn to combat. Then certain pathogenic bacteria, the colon bacillus, dysentery bacillus, etc., may attack the intestinal mucous membrane, and against these antibodies must be prepared. It is probable that many of the gastro-intestinal disturbances of infancy are in the nature of such immunizing processes.

Soon after birth, too, the infant begins to fight the infections of the air passages. It is now generally conceded that the majority of socalled "colds" are really infectious diseases, and depend on a large variety of microorganisms.

We are familiar with the phenomena incident to these diseases of the respiratory organs. It is deplorable that most children possess a very short period of effective immunity after each attack. Repeated attacks extending over several years are often necessary before a relatively permanent immunity results. In the attainment of this immunity a great many factors are operative—the proper antibodies in the blood, activity of the leucocytes and cells, blood supply, and lymph outlet. Most children and many adults never

become completely immune, but we do expect that the healthy child will ward off any of these infections with a short congestion of the upper respiratory tract and a little secretion of mucopus, and little, if any, general reaction. What we dread is a slow and feeble response to the infection, so that the bacteria are not checked in their growth before a very extensive invasion of the tissues takes place.

This relative immunity is acquired at various ages. We all have seen infants repeatedly infected by their older brothers and sisters, passing through severe infectious process of the respiratory organs, rhinitis, tonsillitis, otitis media, bronchitis, bronchopneumonia, and other respiratory diseases, having a perfectly awful time, and yet emerge from all these, vigorous, healthy, and possessing a strong and permanent immunity. Judging from my own figures, most children show this permanent immunity only at the age of 8 to 10 years; some even later. Very disastrous are the first two years of school life to many children, who had been healthy previously, because there had been little exposure to diseases of the respiratory organs before that time. They contract repeated attacks of respiratory disease, going to school one week and remaining at home two weeks with an acute illness.

My observation shows that the child beginning his school life without the tonsils is in greater danger of acute diseases than one who still has his tonsils. It is at this age that the tonsils are so frequently removed simply because they are large; the physician apparently forgets that this enlargement is a physiological and probably a compensatory process. If the tonsils are not present, then some other part of the respiratory tract takes up the defensive activity; the nose becomes so frequently inflamed and suppurates; or the bronchioles become the seat of an inflammation and mucopus is discharged; or the lungs themselves take up the laborious fight. An acute otitis media often takes the place of an acute tonsillitis.

The tonsils are the first line of defense in the infections of the mucous membrane of the nose and throat. Clinical experience supports the view of Sonneman, that the infectious material in the nose or nasopharynx that penetrates the mucous membrane is carried to the tonsils. Here it is silently destroyed if the proper ferments are present. If immunity does not exist, the tonsil becomes inflamed and the offending microorganisms are quickly extruded, with the leucocytes and lymphoid cells, into the follicles of the tonsils. At the same time toxins and, sometimes, living bacteria enter the circulation and stimulate the production of antibodies. It is a clinical fact that an acute tonsillitis prevents the spread of a respiratory infection. The tonsil, whatever be its other functions, may be regarded as a submucous lymphatic node, and it resembles in function Peyer's patches and the solitary follicles of the intestine,

which also have the function of extruding bacteria, as is observed in various forms of enteritis.

I am fully aware that the data herewith presented are inconclusive; first, because the number of cases is insufficient and, second, because there is no parallel control of children who have not had their tonsils removed. But the clinical impression is definite that the young child is sometimes harmed by the removal of the tonsils.

In children under 7 years of age the removal of the tonsils and adenoids should be undertaken only after a careful examination of the child's nutritional and immune condition. It becomes in the main a pediatric question. The tonsils become more or less infected in every acute inflammation of the upper air passages, and may have the appearance of diseased tonsils for some time. It is usually better to wait, and try to bring about a complete restoration of the tonsils' integrity by hygienic and medicinal means, just as is done in the case of an infected gland in the neck.

CONCLUSIONS.

I do not wish to be misunderstood. I yield to no one in zeal to have the tonsils or adenoid vegetations removed, at any age, when these have become diseased and useless. When the pharyngeal tonsils become permanently enlarged, so as to cause persistent mouth breathing and deafness, they should be removed. When the tonsils are deeply imbedded and cannot discharge their contents, and abscesses result, they are a menace to the body. When the tonsils have become scarred from scarlet fever, diphtheria, or a severe streptococcus infection, they should be removed. An infected tonsil which leads to persistent adenopathy, and does not yield to a few weeks' medical treatment, should come out. Children who have had an attack of endocarditis preceded by tonsilar infection should have the tonsils removed.

However, since the remote results of tonsillectomy in the young child have not been sufficiently studied, and my own experience indicates the probability of an increased tendency to pneumonia in such children, I desire to make a plea for a conservative attitude toward the question of tonsillectomy in the young child. The tonsils should not be removed for fancied or trivial causes in a child under 7 years of age.

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CURRENT NOTES

Plea for Rigid Standard of Cure in Gonorrhea.

After an impressive survey of the dangers of a too lax standard of cure in gonorrhea, the authors propose a standard which should be adhered to in every case. By implication in the context, one gathers that this is substantially the procedure used in the free clinics of the local government board in England and Wales, clinics to which a physician may send a patient for the special purpose of undergoing examination.

SUGGESTED SCHEME.

In the interest of the public health it is imperative that the most stringent standard of cure should be employed before a patient who has suffered from gonorrhea is "discharged as cured." If such a practice does not obtain, many patients will be set at liberty with a fallacious sense of security. In this way venereal clinics and practitioners will be acting as distributing agencies of disease.

We venture to suggest below a course of procedure to be followed before a patient is discharged.

I. MALES.

1. Suspend treatment for at least one week. Patient should be advised to take alcohol as a provocative stimulant. If for any reason this should be considered inadvisable, the alcohol may be administered as a nonrecognizable constituent of some palatable mixture.

2. Patient to present himself for examination, having, if possible, refrained from micturition all night, or at least from four to six hours. Meatus examined and urethra "milked up" from bulb. The bacteriologist takes meatal drop on platinum loop, film is made, culture-tube is then inoculated. If no meatal drop, then platinum loop is to be passed into urethra and mucous membrane stroked forward, and film made and tube inoculated from wire. Patient micturates first portion of urine into sterilized vessel, which bacteriologist examines in culture media. Centrifugalization to be carried out or not as seems desirable. Any threads or deposit examined in film and culture. Glans penis is cleansed with soap, and later on with sterilized water, foreskin retracted, and urethra washed out with sterilized water, and patient placed in knee-elbow position; the glans penis is not to be touched; shake out last drop of fluid in urethra. Systematically palpate prostate and vesicles, special attention to be made to any feeling of abnormality—e. g., thickened or occluded vesicles or nodules in prostate. Massage prostate and vesicles till a drop appears at meatus or presents itself after milking urethra forward from the bulb.

The drop may be either like white of egg—i. e., slightly opalescent and homogeneous—or in marked cases turbid, yellow, or granular.

Films are then made of the prostatic and vesicular fluid and culture-tubes inoculated.

The glycerine drop is a product of the anterior urethra, and indicates that the prostatic or vesicular secretion has not presented itself at the meatus.

Finally, a urethral examination should be made, preferably by Wyndham Powell's instrument with magnifying eye-piece. The instrument having been passed, the anterior urethra from the bulb forward is carefully examined in order to ascertain its condition as regards (a) hard or soft strictures or infiltrations; (b) intraurethral warts; (c) infected follicles; (d) any abnormal congenital condition—e. g., angiomata. At the same time the roof and the floor should be carefully palpated over the urethroscope tube in order that any periurethral infiltrations present may be discovered.

The glans penis is to be examined for paraurethral follicles, especially in the cases of patients exhibiting a hypospadiac or epispadiac condition. The perineum should be examined with a view to discovering the presence of cowperitis and perineal abscess, etc.

II. FEMALES.

Suspend treatment for at least one week. Patient should be advised to take alcohol as a provocative stimulant. If for any reason this should be considered undesirable, the alcohol may be administered as a nonrecognizable constituent of some palatable mixture. Examine as soon after menstrual period as possible. It is advisable to always wear gloves during examination of females. An abdominal examination should be made with the object of noting any abnormality. The patient should be examined in the dorsal position, leaning back in a urological chair, with the thighs flexed on abdomen and knees supported in crutches. The examiner wears a suitable head lamp.

METHOD OF EXAMINATION.

1. Remark presence or absence of discharge, and, if any, note quantity, consistency, and color.

2. *Vulva.*—Vulva is to be cleansed and Bartholin's glands to be carefully examined; note specially redness around opening of same—squeeze out contents if possible; resultant fluid to be placed by bacteriologists on film or culture-tube.

3. *Urethra.*—The meatus is to be examined for the presence of pus. The floor should be pressed forward by finger in vagina and film should be made and culture-tube inoculated with the secretion expressed. If no drop expressed, platinum wire passed into urethra, and mucous membrane stroked forward; slides should be made and tubes inoculated from wire. Crypts in vestibule around meatus urinarius should be carefully looked for and notice taken as to infection. Small retractor speculum should be introduced and the urethra examined thereby, especially as regards infected Skene's tubules. Patient micturates; culture-tubes to be inoculated; centrifulgalization if deemed necessary.

4. *Vagina.*—A speculum, preferably Cusco's or Ferguson's, is to be introduced and an examination made of the vagina. The cervix is to be exposed and any pathological appearance, such as erosion, polypi, cysts, or ulcer, noticed. If secretion (either the normal ropy mucous secretion or pus) issues from the cervical canal, a film is to be made and a culture-tube inoculated. If none is seen, then gentle pressure should be made by means of a blunt spongeholder forceps in an anteroposterior position, so that the contents of the deeper cervical glands may be expressed. A film should be made and a culture-tube inoculated with any secretion so obtained.

5. A bimanual examination of the uterus and adnexa should be made, so that evidence of any disease may be noted.

The above should be carried out on two occasions at intervals of a month.

It is advisable that the bacteriologist should be present himself and take his own specimens.

No mention has been made of the place of provocative vaccines and the complement-fixation test in connection with testing for the presence of gonococci. We realize the potentialities associated with these methods, but we do not at present regard their efficacy as sufficiently proved to justify their inclusion in a routine scheme.—Simpson and Clarkson, The Lancet, Nov. 30, 1918.

Scurvy.

I. *Inferiority of Limes as Antiscorbutics, Compared with Lemons.*—A research at the Lister Institute, carried out by Chick, Hume, and Skelton, is reported, together with a historical inquiry by Alice Henderson Smith. The following are the conclusions:

1. The antiscorbutic value of the juice of fresh limes (*Citrus medica,* var. *acida*) has been compared experimentally with that of fresh lemons (*Citrus medica,* var. *limonum*) and has been found to be distinctly inferior. Volume for volume, fresh lime juice possesses a potency of about one-fourth that of lemon juice. In one instance severe scurvy developing in a monkey on a diet containing a small daily ration (5 c.cm.) of fresh lime juice was cured by an equal ration of fresh lemon juice.

2. Preserved lime juice was found useless for the prevention of scurvy by the method employed. Experiments with preserved lemon juice are still in progress, but give promise of better results.

3. The experimental results are fully confirmed by a historical study of "lime juice" in connection with human scurvy. At the period when scurvy was eliminated from the British navy by its agency, the term was used to express the juice of lemons, and it was not until the second half of the nineteenth century that the juice of West Indian limes was adopted in the navy and mercantile marine. The history of two arctic expeditions, that of the "Investigator," 1850, and that of the "Alert" and "Discovery," 1875, has been carefully investigated. The former, supplied with lemon juice, experienced remarkable immunity from scurvy during the first two years of great difficulty and privation; the latter, supplied with lime juice, suffered severely from scurvy at the end of the first winter spent in the arctic regions.

It should be noted in connection with these facts that scurvy is a disease with a long period of development. As much as four to eight months on a defective diet may elapse before definite symptoms of scurvy can be observed.

II. *Memorandum on Food and Scurvy* by the Food (War) Committee of the Royal Society.—In view of the fact that outbreaks of scurvy have occurred at various times, both in this country, and abroad in His Majesty's forces, and in order to guard against a recurrence of such outbreaks, especially at places far removed from sources of supply, the Royal Society Food (War) Committee has issued the following memorandum, based chiefly on investigations carried out at the Lister Institute:

1. Scurvy, like beriberi, is a "deficiency disease," and is due to the long-continued consumption of food lacking in an accessory food substance or vitamine. The view that scurvy is due to tainted food must be abandoned.

2. This vitamine is contained in a number of fresh foods; in largest amount in oranges, lemons, and fresh green vegetables; in considerable amount in roots and tubers, such as swedes, potatoes, etc.; and in small quantities in fresh meat and milk. It is deficient in all dried and preserved foods.

3. It is destroyed by prolonged heating, such as takes place during stewing. Thus, potatoes in stews would be devoid of vitamine, but, if boiled rapidly, will still contain some quantity. Alkalies rapidly destroy antiscorbutic properties. Soda should therefore not be added to the water in which vegetables are soaked or boiled.

4. Before the onset of definite symptoms of scurvy there is a period of debility and weakened resistance to disease. The occurrence of cases of debility in any body of troops without sufficient cause should at once direct the medical officer's attention to the sufficiency of the diet.

PREVENTION OF SCURVY.

5. West Indian lime juice, as ordinarily prepared, is useless for the prevention of scurvy. Fresh limes have an antiscorbutic action, but their efficiency is only one-fourth that of lemons. The socalled "lime juice," by the regular administration of which scurvy was eliminated from the navy during the first half of the nineteenth century, was really lemon juice obtained from the Mediterranean. The history of arctic exploration affords numerous examples in which scurvy was prevented for long periods of time by the agency of lemon juice regularly taken. Nares' expedition of 1875, notorious for the serious outbreaks of scurvy encountered, was the first to be provisioned with "lime juice" prepared from West Indian limes. Orange juice is as effective as lemon juice.

6. Potatoes and root vegetables have a distinct value in the prevention of scurvy, much less, however, than green vegetables or fresh fruit juices. A daily ration of 14 ounces of potatoes, boiled rapidly but not stewed, will suffice to prevent scurvy.

7. Pulses, beans, peas, and lentils in the dried condition have no antiscorbutic properties. If, however, the dried seeds are soaked in water and are allowed to germinate for a short period, one or two days, they develop the antiscorbutic vitamine. At the same time these pulses are also rich in the vitamine which prevents beriberi, and are, moreover, valuable foods.

The method adopted for germination is as follows: The beans, peas, or lentils are soaked in water at room temperature (60° F.) for twenty-four hours. The water is then drained away and, to permit germination, the soaked seeds are spread out in layers, not exceeding 2 to 3 inches in depth, and are kept moist for a period of about forty-eight hours at ordinary room temperature (60 F.) They should not be allowed to dry after this operation, but should be cooked as rapidly as possible (lentils, 20 minutes; peas, 40 to 60 minutes).

8. The antiscorbutic value of fresh meat is very low in comparison with that of fresh vegetables and fruit. If fresh meat is consumed in large quantities, 2 to 4 pounds a day, scurvy will be prevented. Tinned and preserved meat possess no antiscorbutic value. Frozen meat, while more valuable than preserved meat, must be considered inferior to freshly killed meat in this respect.

METHODS OF COOKING.

9. The destruction of the antiscorbutic properties depends rather on the time than the temperature employed. All foods, especially vegetables, should be cooked for as short a time as possible at boiling point. Slow methods of cooking, such as stewing with meat or simmering below boiling point, should be avoided. Potatoes should be plunged into boiling water and the boiling continued for 20 to 30 minutes after the boiling point has again been reached. Frozen meat should be roasted when practicable.

The memorandum closes with a summary of measures recommended for the prevention of scurvy when fresh vegetables are unobtainable: (a) The lime-juice ration should be replaced by lemon juice; the ration should be 1 ounce daily, served with sugar. (b) Cooked germinated peas, beans, or lentils should form part of the regular daily ration. (c) Attention should be paid to the methods of cooking employed, as set forth under 9.

DIET AND TOOTH FORMATION.

1. A diet containing in abundance those articles with which the fat-soluble A accessory food factor is associated—e. g., cod-liver oil, butter, etc.—allows the development in puppies of sound teeth.

2. A diet otherwise adequate but deficient in the substances with which fat-soluble A is associated brings about the following defects in puppies' teeth: (a) Delayed loss of deciduous teeth. (b) Delayed eruption of the permanent dentition; in some cases the delay in the eruption of the permanent teeth is more marked than the delay in the loss of the deciduous teeth. (c) Irregularity in position and overlapping, especially of the incisors. (d) Partial absence of or very defective enamel. (e) Low calcium content; the deficiency in calcium salts may result in the teeth being so soft that they can be cut with a scalpel.

3. The evidence makes it clear that this is an instance of diet affecting the teeth from the inside and is independent of bacterial sepsis and other oral conditions associated with food.

4. These results cannot be considered as being due to acute illness or "malnutrition," for (a) the improvement to the teeth by the addition of fat-soluble A containing substances (animal fats, etc.) is as characteristic as the deleterious effect of a deficient diet; (b) there is evidence that the defective teeth are most pronounced in the rapidly growing puppies, and it is difficult to associate rapid growth with illness or "malnutrition," as generally understood.

5. This work, taken in conjunction with the experiments of E. Mellanby on rickets, puts the close relationship between hypoplastic teeth and rickets on to an experimental basis.—Mellanby, The Lancet, Dec. 7, 1918.

BOOK REVIEWS.

THE SPLEEN AND ANEMIA—Experimental and Clinical Studies. By Richard Mills Pearce, M.C., Sc.D.; Professor of Research Medicine; with the assistance of Edward Bell Krumbhaar, M.D., Ph.D., Assistant Professor of Research Medicine, and Charles Harrison Frazier, M.D., Sc.D., Professor of Clinical Surgery, University of Pennsylvania. With 16 illustrations, color and black and white. Philadelphia: J. B. Lippincott Company, $5.

In this volume splenectomy is considered, first, as a means of studying experimentally in animals the relation of the spleen to blood destruction and regeneration, and, second, as a therapeutic procedure in the treatment of diseases of man accompanied by anemia. No attempt is made to discuss injuries, infections, and tumors of the spleen, or, except incidentally, the problems—leukocytosis and leukemia—of the white blood cells. The emphysis is on the side of the red blood cell and the relation of the spleen to the quantitative and qualitative changes which the red cell may undergo.

The chapters on experimental and metabolic observations are based on some twenty-odd studies carried out during the past five years in the John Herr Musser Department of Research Medicine of the University of Pennsylvania, and reported from time to time in medical periodicals, under the general title of "The Relation of the Spleen to Blood Destruction and Regeneration and to Hemolytic Jaundice." These various papers have been rearranged and largely rewritten, and brought into relation with the general literature so far as to offer a consecutive comprehensive presentation of the general experimental problem.

Such experimental studies are obviously of importance in connection with the diseases of man characterized by splenomegaly with anemia or jaundice, or both, and in connection with which splenectomy, as a therapeutic procedure, has recently been so widely tried. Clinical studies of the splenomegalies and of the results of splenectomy in man are therefore presented by Dr. Krumbhaar. These chapters bring into one volume for the first time the modern views concerning the classification, diagnosis, and treatment of the noninfectious splenomegalies characterized by blood destruction. The final section by Dr. Frazier gives details of the technic of the operation of splenectomy in man. This has been included, partly to complete its presentation, but chiefly to bring out new points concerning the operation which have been gained as the result of its widely extended use during the last few years.

DIETOTHERAPY. Chemistry and Physiology of Digestion, Classification, and Analysis of Foods. By William Edward Fitch, M.D., Major Medical Reserve Corps, U. S. A., Formerly Lecturer on Surgery, Fordham University School of Medicine; Assistant Attending Gynecologist Presbyterian Hospital Dispensary; Attending Physician to the Vanderbilt Clinic, College Physicians and Surgeons, New York City, and forty contributors. Volume I. Published with the permission of the Surgeon General of the Army. New York: D. Appleton & Co., 1918, $21. Sold only by subscription.

While much has been written of late on the subject of nutrition and dietetics, it is widely scattered through various books, journals, pamphlets, and government and scientific reports, which are not readily accessible nor sufficiently comprehensive to furnish the physician with a foundation on which to build a practical working knowledge of the scientific application of foods in either

health or diseased conditions. Besides, much of this matter is too ultrascientific to be of practical value to the busy physician.

In order to understand the rationale of nutrition, a working knowledge of the chemical changes which the foods undergo in the body is necessary. Therefore the body must be guarded as a human laboratory of nicely balanced chemical reactions. This knowledge of physiological chemistry is so essential that much space is devoted to the subject in Volume I, embracing a concise presentation of the fundamental principles, including the most essential facts of physiological chemistry, with a brief but succinct description of the digestive organs, explaining the special functions of each in the process of digestion, and graphically describing the physiology of the absorption of foods. Without such a knowledge of the chemistry and physiology of digestion, many of the statements with regard to nutrition would convey but the most vague ideas to the reader. . This work is the outcome of nearly two decades of laboratory research and clinical investigation of the practical application of the principles of trophotherapy to the science of nutrition in both health and disease. The purpose of the work, from a purely therapeutic standpoint, is to awaken in the mind of the general practitioner the great importance for a biochemic study of nutrition, and to encourage in him a line of inquiry leading up to a thorough understanding of the subject of trophology, trophodynamics, and trophotherapy.

CLINICAL CARDIOLOGY. By Selian Neuhof, B.S., M.D., Visiting Physician, Central and Neurological Hospital Adjunct; Attending Physician, Lebanon Hospital. New York: Macmillan Company, 1917.

In his Clinical Cardiology Neuhoff has attempted to present in proper proportion the instrumental and bedside methods of diagnosis, and has devoted especial attention to the matter of therapeutics. The opening chapters are devoted to a description of instrumental and graphic methods in the study and examination of normal and abnormal rhythms and of normal and abnormal silhouettes. From a study of these chapters the physician is enabled to discern the relation and application of instrumental methods to clinical cardiology and bedside examination. Without minimizing their importance, the writer has emphasized the fact that instrumental methods are not infrequently subsidiary. Indeed, as he points out, graphic devices may sometimes be dispensed with if their fundamental significance is comprehended. Subsequent chapters are devoted to the purely clinical side of cardiology. Careful consideration is given to the important subjects of the pathology, etiology, diagnosis, prognosis, and therapy of endocarditis, myocarditis, and cardiosclerosis. Questions occurring in every-day practice with reference to diet, exercise, and general management of heart disease are dealt with. There are special chapters on precordial pains, blood pressure, and the heart in pneumonia. The volume may thus be commended as a useful reference book for practitioner and student.

DIFFERENTIAL DIAGNOSIS. Volume II. Presented Through an Analysis of 317 Cases. By Richard C. Cabot, M.D., Assistant Professor of Clinical Medicine, Harvard University Medical School, Boston; Chief of the West Medical Service at the Massachusetts General Hospital. Second edition, revised. Profusely illustrated. Philadelphia and London: W. B. Saunders Company, 1918, $6.

The second edition of Volume II of Cabot's Differential Diagnosis does not differ, except in some details, from the first. A variety of symptoms are illustrated by typical examples, one of the most interesting chapters being that on vertigo. Whatever the merits of Cabot's method, on which there is much difference of opinion, the volume will be found entertaining and moderately instructive.

EDITORIAL.

FACT, THEORY, PRINCIPLE.

Some years ago a manual of elementary physics and chemistry was published for the use of the secondary schools of Egypt. In the preface the authors claimed as a merit that they had sought to teach facts rather than to expound theory. With unanimity we critics fell on the writers of this preface. "Facts," we said in effect, "are not important in comparison with principles. Facts may be misinterpreted, theory may be erroneous, but scientific principles are eternal. The object of a science course should be to teach principles. Many of Newton's "facts" have been shown to be errors of observation; his theories have been refuted, but the principles on which he worked have remained solid.

Recent experience has made one doubt the wisdom of this wholesale condemnation, from the pedagogic point of view. Pedagogues have been as intemperate as our own medical profession in the following of new fashions. The heuristic method has been overworked; the teaching of bare principles has, in other directions, been pursued to the neglect of particular cases. Students are directed to the working of what is grandiosely styled "a research problem" before they have learned what others have done.

One has had much to do with (and to suffer from) the product. Young ladies who have "taken" (and left) this, that, or the other "course" in some part of chemistry or physics, and, as "The Phenomena of Impermeable Membranes" at colleges of high repute, are found to be in the darkest ignorance about the most elementary parts of those sciences. Others have calibrated burettes, can weigh by vibrations, and estimate the silver in a solution, but do not know how to test a simple solution for sulphuric acid, and imagine that a low red heat is about 160° C. Such optional courses inflate the program of the schools. They are bombast.

But there is in all this the old struggle between casuistic and doctrinaire teaching. In Europe this contest turns chiefly on the teaching of law and, secondarily, on that of clinical medicine. In

each instance, and notably in the former, the recognized protagonists are the English and the French. Doubtless the different authority of case law in the two systems has largely contributed to the distribution of the antagonists. But the genius of the two races has had the greater influence.

It is appropriate that this country should be the terrain for an attempt to fuse the systems. So far the attempt is a dismal failure, but success is bound to attend the effort if the nature of the issues is clearly understood.

SELF-SUFFICIENCY IN SCIENTIFIC MATERIALS.

Those of us whose occupations involve the use of fine chemicals and scientific apparatus are daily made to feel our prewar dependence on Germany and Austria for the filling of some of our most essential needs. Substitutes of approximately or of entirely equal value have been produced in this country or in cobelligerent or neutral countries in a few instances, and an effort is being made to increase our self-sufficiency in this matter; but in most cases, where the quality is equal, the price is nearly prohibitive. In this difference in retail price the difference in labor cost is known, for this class of goods, to be but a small item.

There are signs here and in England of a relapse into the old attitude of the manufacturer toward research. The chairman (who would here be styled the president) of a great British dyemaking corporation, in a speech before the constituent assembly, placed, by implication, the blame for the original loss of the dye industry on the chemists, who would not "adapt themselves to the methods of the manufacturers." Having been in close personal contact with the founder of the coal-tar dye industry, Sir William Perkin, I am in position to say what the manufacturers' exigencies were. They declined to pay for the "nonsense of scientific research." They would have the chemists do the researching, and, when these had bankrupted themselves with the expense thereof, the manufacturers would take their discoveries from them at their (the manufacturers') price. The price, being determined by the urgent needs of the chemist, would naturally be inversely proportional to the time the latter had spent on the research.

Even this is a shade better than the attitude of the hierarchs of our own profession, who seem to think that research chemists should devote ill-paid years of their lives to the investigation and discovery of synthetic remedies and then forego all profit thereon. In other words, only the aforesaid hierarchs should make profits on these discoveries by charging heavy fees for the administration of their remedies.

*   *   *   *

Aside from this exploitation of the scientific man and that threat of a relapse into purblindness to the commercial value of research, there is another cause of trouble in the wind. Our manufacturers will not handle the production of fine products required in small quantities for the purpose of research. It seems beyond hope that we can convince them on this point. Yet none of us wants to go back to Kahlbaum and Grübler.

Is there an alternative?

It is believed that the Department of Chemistry of the University of Illinois has found the solution of our problem. The laudable initiative of this laboratory in the production of fine chemicals for research and analysis has already been alluded to in these columns.[1] The result of the action of the University of Illinois has been to rouse interest in the possibilities of an expansion of this effort.

No more valuable work for science, no more instructive exercise for students can be found than the production of those fine chemicals under conditions where the yield and quality are strictly controlled.

The teaching laboratories of this country should unite and, possibly with assistance from the great foundations, lay out a program of work along these lines. It might suffice for a start to take Grübler's and Kahlbaum's lists, and, having submitted them to a careful revision, distribute the production of such articles as are not commercially available among the laboratories. While first each laboratory would more or less specialize, a rotation of typical processes might eventually be established which would round out the educational purposes of the scheme.

* * * *

But if such a scheme is to be successful, we must have an attitude on the part of Government departments very different from that displayed in the following instance: Among the industries in which Germany has entirely outstripped her competitors is that of the synthetic remedies. The manufacturers and laboratories among the allies and in this country have been urged to strain every nerve to catch up in this respect. Now, there is one recognized authoritative work on the subject—Fränkel—of which no English translation exists. Yet, when an American, believing that he could obtain a copy through a Swiss house, which copy would have been at the disposal of an American laboratory, applied for permission to import, the necessary permit was, "after full consideration," refused. This looks very like Bumbledom *in excelsis!* The American of which is, I suppose, "boneheadedness in high places."

How differently the wide-awake Japanese look on these matters is shown by the passage through this country of numerous agents who fine-combed our laboratories and libraries for German instru-

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[1]Interstate Medical Journal, March, 1918.

ments and works, offering, in many instances, premium prices for used goods.   *   *   *   *

It is no use consoling ourselves with the reflection that pioneer discoveries in chemistry have rarely been German. This is entirely true, but irrelevant. It is equally true that the greater bulk of chemical discovery is "made in Germany," and that it has at present more great chemists than any other country or collection of countries. Where is there a rival to Emil Fischer?

It is not by underestimating our foes that wars, military or industrial, can be won. We must wake up and shake off our flattering dreams.

EDITORIAL COMMENT.

While the French medical press abounds in references to and descriptions of the use of ether as an antiseptic dressing, the literature published on this side on this subject is extremely meagre. Partly, no doubt, this is due to the quasichauvinistic character of the press agent work in laudation of the Carrel-Dakin technic. Ether, as a dressing, seems to be a French idea.

So far as it has received notice on this side, it has chiefly been in connection with its extensive and increasing use for washing out wounded knee-joints, being used either alone or in conjunction with saline solution. It is by no means limited in its utility to this special case, and appears to have conquered the first place in the estimation of French surgeons as the antiseptic of choice. This is due to its detergent, penetrative, antiseptic, and cytologic action.

There is no doubt of its high penetrative action, and its known properties would seem to foretell a detergent action such as is claimed for it. It is, *in wound conditions*, a powerful antiseptic. One of its great advantages is that it permits of renewal without disturbing the dressings, a point of no little importance in war or rural surgery. It causes no soddening of the tissues. As applied to boils and carbuncles, it limits extension, and causes the formation of true pus, evacuable through a puncture or small incision.

It is understood that ophthalmologists are agreed that the normal young eye is subject to unfavorable modification, and even positive lesion, as a result of undue strain. This must be still more the case with abnormal eyes. Unrestricted and unregulated motion picture frequentation must be a source of such eyestrain. This is particularly so because, as anyone may observe for himself, the younger members of the audience elect to sit as near the screen as is possible.

The undoubted educational possibilities of the motion picture render it desirable to remove its few disadvantages. It might be made a regulation—voluntary or compulsory—that children should not be allowed in front of a line subtending, say, twice the visual angle of the view.

ORIGINAL ARTICLES.

LOCAL ANESTHESIA IN CHILDREN.

By ROBERT EMMET FARR, M.D., Minneapolis, Minn.

For some years I have been testing the application of novocain in surgical work on children. My initial success was so surprising in a child of 18 months, in which an inguinal hernia was repaired, that I have been prompted to continue its use and to apply it in a variety of conditions.

The operations performed have included those upon the head, neck, limbs, external genitals, spine, and abdomen. In all, 77 cases have been attempted with local anesthesia, and in only 7 of these has it been considered necessary to add inhalation anesthesia.

Occasional reports in the literature show that some surgeons have given local anesthesia a trial in children with favorable results, although most authors condemn the method as unsatisfactory. Quite recently La Chapelle[1] reported having done major operations upon children under local anesthesia, and he views the method with approval. Haggard,[2] in a paper on Congenital Hypertrophic Stenosis, states that novocain is the anesthetic of choice in children with this affliction, though he does not mention the number operated upon by him by this method.

In June, 1917, at the New York meeting of the American Medical Association, I reported having performed successfully with novocain, a number of operations upon young children, and showed a motion picture of a boy of 5 years undergoing an operation for inguinal hernia. All steps of the operation were shown, the lad amusing himself the while by drinking buttermilk and "making faces" at the nurses and the "picture man."

There is no reason to doubt that, relatively speaking, novocain is as safe in the child as in the adult. Moreover, the psychic element is less troublesome. To be sure, these little patients may be frightened at their new surroundings, and all very young ones have to be restrained by mechanical means (Fig. 1) until they learn that they are not to be hurt; but we very early learned that the restraint necessary during the introduction of novocain did not compare with that ordinarily found necessary when general anesthesia was being administered. A majority of those above 4 years of age submitted without mechanical restraint. Many of them, as soon as they found

that they were not to be hurt, began to "show off" and exhibit clever stunts, of which they were proud. Bribes of various kinds have been used as bait for good behavior, and the results achieved along these lines are gratifying. Candies, money, and toys are especially effective. A prize of $1 offered to a boy of 4 took him through an operation for inguinal hernia and the excision of a hydrocele sac without shedding a tear. The only one of this group

Fig. 1.—Illustrating the method of controlling young children in operations under local anesthesia. By making traction on the arms, the anesthetist controls the child when necessary.

who suffered postoperative vomiting was a case of hypertrophic pyloric stenosis, and here vomiting was late and had no relation to the anesthesia per se.

In working upon children the same refined technic is required as that found necessary in working upon the adult. Sharp dissection and careful traction and manipulation must be adhered to. Abdominal work requires anesthesia which results in *negative intra-*

abdominal pressure. *Vertical retraction* and *tilting* of the *body* are used to bring the organs into view. Just as in the adult, protrusion of the abdominal viscera through the incision is to be looked on as evidence of incomplete anesthesia if it occurs in the absence of vomiting or (in the case of children) crying. In the adult no packing should be required to prevent this protrusion of the abdominal contents. This is especially true with lower abdominal incisions. In the child one must guard against this protrusion in case the patient should begin crying. A sponge must be kept ready for this emergency, and, should it arise, used to prevent evisceration —not by packing gauze into the abdomen, but rather by plugging the opening temporarily. By applying towel forceps to the edges of the incision, the abdominal wall may be elevated gently and the abdominal contents examined visually to a degree seldom found possible under general anesthesia. The flaccid abdomen resulting from a perfect local anesthesia gives one a condition almost like that found at autopsy. The constant motion of the viscera seen so commonly under general anesthesia is almost entirely absent. This is especially true in the absence of distention or acute inflammation. In acute conditions where abdominal distention is marked, as in acute appendicitis, intussusception, etc., narrow gauze packs can be inserted with slight inconvenience, provided the abdominal wall is anesthetized over a wide area, so that vertical retraction can be made without pain (Figs. 2, 3).

Operative procedures on a child must be carried out in a manner which might be appropriately designated as "stealthy." Failure may follow any overt act which violates the more or less clearly defined routine one must follow. For instance, I have found that the hasty or careless introduction of a retractor by an assistant who was not conversant with the method has caused a sharp contraction of the abdominal muscles, with a consequent extrusion of the intestines. This emergency necessitated the administration of ether in a boy of 4 years, upon whom I was operating for inguinal hernia, and who, up to the time that the assistant "gouged" him with the retractor, had not even needed restraint and had not made any outcry.

Another frequent cause of trouble is due to the assistant allowing the retractor to slip out of the wound. Such an accident will also cause a sharp contraction of the abdominal muscles, and should be avoided. In children most of the retraction is done by automatic wire retractors, or towel clamps, which eliminate these difficulties to some extent.

Preliminary hypnotics have been tried—paregoric in infants and pantopon hypodermically in older children—but the dosage and effects are so uncertain that little benefit is to be expected from
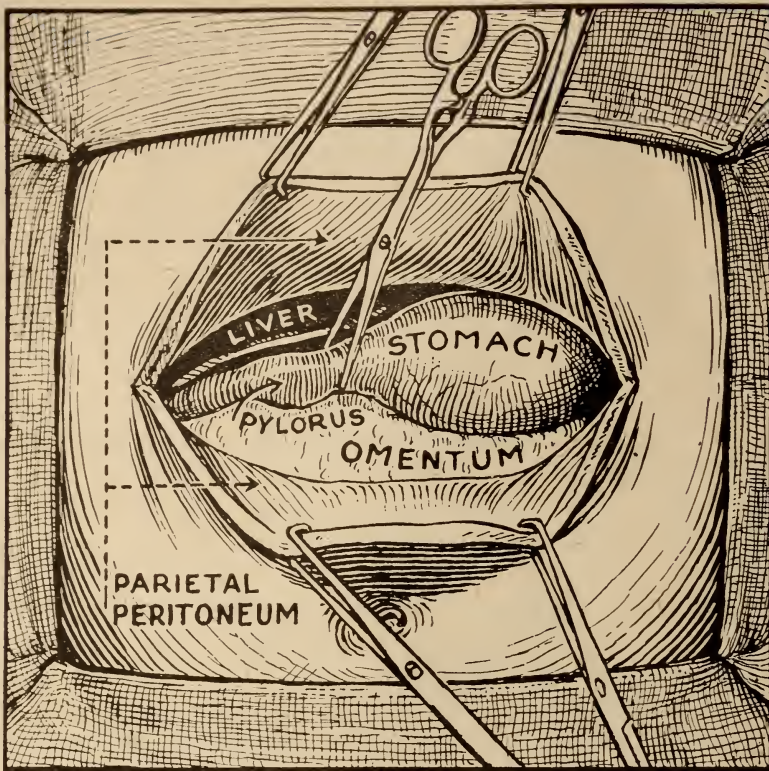
Fig. 2.—Illustrating the manner of handling the abdominal wall. By making vertical retraction, the abdominal contents are allowed to fall away from the incision.
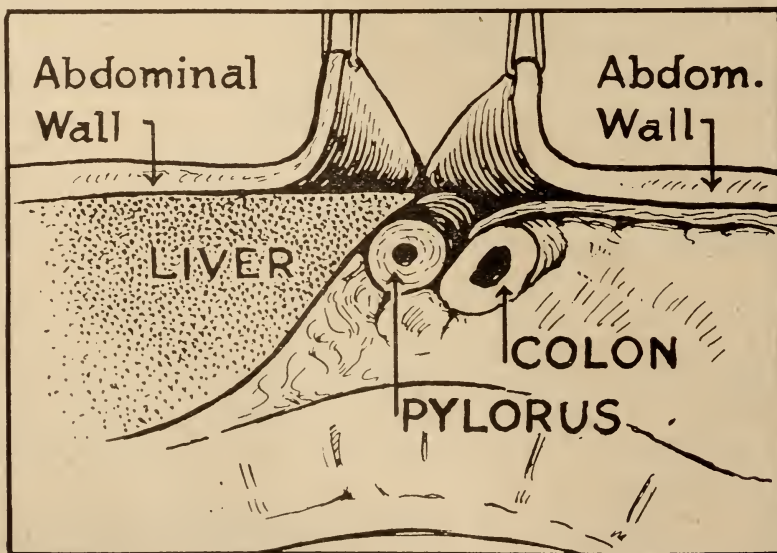
Fig. 3.—Illustrating the sagittal view of Fig. 1.

this source, and they are, probably, unnecessary. In children, as in adults, it is our practice to make the complete infiltration before beginning the operation. We consider that we have made an error in technic, provided it becomes necessary, in the operation for

Fig. 4.—Florence D., aged 12 years. Grattan osteoclast in place, refracturing malunited femur.

Fig. 5.—Wallace W., aged 13 years. Undergoing operation for undescended testicle and hernia.

hernia for instance, to inject the deeper layers after the skin incision is made. Even the blocking of nerves, as they present, is usually unnecessary, although it may be well to take this precaution.

The most important point, aside from the above, is the avoid-

Fig. 6.—Andrew W., aged 4 years. Enlarged cervical glands. Complete dissection of the left side was done. Before operation.

Fig. 7.—Same subject as Fig. 6. Injection being made.

ance of pain in making the infiltration. This is done by making all secondary wheals from beneath, and by making subdermal rather than intradermal injections for the anesthesia of the skin. The deeper infiltration is to be made slowly and methodically under a constant, even pressure. Whereas in adults the needle may precede

Fig. 8.—Same subject as Fig. 6. Mass of glands the size of a man's fist delivered.

Fig. 9.—Same subject as Fig. 6. At finish of operation.

the outflow of the novocain, in children the fluid should advance into the tissue just ahead of the point of the needle.   The area to be blocked should be "soaked," or, in other words, completely saturated with novocain.   If this is done, there is no margin of error as to obtaining anesthesia.

A simple method of restraining the child is illustrated in Fig. 1. In most cases of very young children we have used the "arm table" as an operating table, with the operator, assistant, and anesthetist sitting down.

Fig. 10.—Baby G., aged 3 weeks.   Hypertrophic pylorus stenosis.   Directly after operation.

The following operations have been performed upon children under 15 years of age:

	Operations under novocain.	Changed to general anesthesia.
Appendectomy:		
Under 10 years of age........................	5 cases	
Between 10 and 15 years of age................	8 cases	3 cases
8 of these were acute, 5 were chronic.		
Inguinal hernia—radical operation:		
Under 10 years of age........................	6 cases	......
Between 10 and 15 years of age................	4 cases	1 case
Cryptorchidism—transposition of testicle:		
13 years of age..............................	1 case	......
Hypertrophic pyloric stenosis—Ramstadt operation:		
3 weeks old.................................	1 case	......
6 weeks old.................................	1 case	......
Spina bifida—closure:		
2 days old..................................	1 case	......
2 months old................................	1 case	......
Macropedia—amputation of portion of foot:		
16 months old...............................	1 case	......

	Operations under novocain.	Changed to general anesthesia.
Circumcision:		
Under 10 years of age......................	7 cases	......
Between 10 and 15 years of age................	5 cases	......
Tonsillectomy:		
Between 12 and 15 years of age...............	3 cases	......
Fractures:		
Under 10 years of age......................	3 cases	......
Between 10 and 15 years of age...............	5 cases	1 case
Removal of bursæ, cysts, ganglion, nevi, and suppurating glands:		
Under 10 years of age......................	5 cases	......
Between 10 and 15 years of age...............	5 cases	......
Cleft palate:		
15 years of age...........................	1 case	......
Dissection of neck for removal of enlarged glands:		
4 years of age............................	1 case	......
Between 10 and 15 years of age...............	3 cases	......
Osteomyelitis of tibia—Beck's operation:		
11 years of age, two operations...............	2 cases	......
Erb's paralysis—excision of scar and suture of nerves:		
3 months old.............................	1 case	1 case
Arthroplasty of hip:		
14 years of age...........................	1 case	1 case
Hydrocele of cord:		
4 years of age............................	1 case	......
Empyema—rib resection:		
6 years of age............................	1 case	......
Trephining—for fractured skull:		
3 years of age............................	1 case	......
Trephining—for brain tumor:		
11 years of age...........................	1 case	......
Tendonplasty of hand:		
14 years of age...........................	1 case	......
Osteoma ulna—excision with chisel:		
11 years of age...........................	1 case	......
	77 cases	7 cases

CONCLUSIONS.

1. The psychic element is not so important in children as in adults when operating under local anesthesia.

2. Less restraint is necessary during the administration of local than during the administration of general anesthesia.

3. Much more tact and a more refined technic are required in operating upon children under local than under general anesthesia.

4. The margin of safety possessed by novocain over general anesthetics is as great in children as in adults.

5. A large percentage of bad risks should have the benefit of this margin of safety.

6. More extensive application of novocain in the surgery of children is indicated, and, if a more common use of this drug obtained in this class of cases, the science of medicine as well as the art of surgery would be benefited.

REFERENCES.

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[2] Haggard, Wm. D. (Jour. Am. Med. Assn., LXXI, No. 10, p. 810).

APPLIED ANATOMY OF THE TERMINAL BOWEL.

By CHARLES J. DRUECK, M.D., Chicago,

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In order to form an intelligent conception of the diseases of the colon and rectum, it will be necessary to review the anatomy of the terminal bowel—the sigmoid colon, rectum, and anus.

THE SIGMOID COLON.

This, sometimes called the pelvic colon, is the narrowest part of the colon; it is the continuation of the descending colon in the left iliac fossa; commencing at the crest of the ilium, it forms a loop, of variable length and position, across the front of the false pelvis, and terminates in the rectum at the level of the third sacral vertebra. It fills the left inguinal region, and can be felt, in thin persons with relaxed abdominal walls, rolling under the fingers when empty, and, when distended, forming a distinct bulge. It varies in length, the average being about 16 inches. When the sigmoid is long, it crosses the median line, going even as far as the right pelvic wall, and then turns back a second time toward the middle of the sacrum, where it joins the rectum, thus making an S-shaped curve within the pelvis. When it is short, as not infrequently occurs, all its curves are abridged and it runs more or less directly backward after entering the pelvis. The sigmoid is surrounded by peritoneum, and is attached to the posterior abdominal wall by the mesosigmoid. When the sigmoid is lifted upward and to the right until the mesosigmoid is put upon the stretch, the intersigmoid fossa is brought into view. The intersigmoid fossa is constant in the fetus and common during infancy, but usually disappears as age advances. As the sigmoid is lifted up and the left mesosigmoid exposed, there will be seen a funnel-shaped recess of the peritoneum, lying on the external iliac vessels, between the psoas and iliacus muscles. This is the orifice leading to the intersigmoid fossa, which lies behind the sigmoid mesocolon and in front of the parietal peritoneum. The fossa varies in size from a mere dimple to a pocket which will admit the whole index finger.

These fossæ are found in the majority of cadavers examined, although in varying frequency according to different observers (Moynihan, 70 percent). In infants it is almost always present, but in later years it becomes less constant. Adhesions and thickenings of the mesocolon obliterate the fossa. The opening of the pouch is in the line of attachment of the sigmoid mesocolon, near the inner

margin of the psoas magnus. Its orifice is round or oval, with a well-defined sharp edge of peritoneum, without any evident blood vessels. The intersigmoid fossa lies behind the sigmoid mesocolon and in front of the parietal peritoneum. It results from imperfect blending or physiological adhesion taking place between the left (posterior) layer of the mesocolon and the parietal peritoneum. Hernia into the intersigmoid fossa may occur. Eve (*British Medical Journal,* June 13, 1885, p. 276) records a case of strangulated hernia into the fossa, and McAdam Eccles (*St. Bartholomew's Hospital Reports,* XXXI, p. 177) also reports a case. Hernia into the intersigmoid fossa may occur in a normal abdomen, without previous peritonitis or abnormality of size or position of the sigmoid flexure or any part of the intestine, or it may occur where gross congenital abnormality may have been a factor.

The sigmoid, when empty, lies in the pelvis, and in women rests upon and behind the uterus, and upon the bladder in the male. When distended, it rises into the abdomen even to the umbilicus. The pelvic mesocolon is fan-shaped, short at either extremity and long in its middle portion. When the sigmoid rises into the abdominal cavity, this mesentery is doubled upon itself. This is of special interest, from the standpoint of applied anatomy, as the long meso-sigmoid permits of great mobility of the pelvic colon, and hence renders this portion of the bowel more liable to volvulus. Individuals subject to habitual constipation have an elongated and attenuated mesosigmoid. The bowel loaded with feces falls over an adjoining loop and becomes twisted. The hypertrophied or impacted sigmoid may also be responsible for retroversion or subinvolution of the uterus, leucorrhea, and many other troubles to which women are subject and for prostatic and bladder troubles in men. Such conditions are all too frequently overlooked, and account for many failures to get results in the treatment of the conditions named when more intelligent efforts might have been crowned with success.

At birth, only the terminal part of the pelvic colon lies in the pelvis, chiefly because of the small size of the infant's pelvic cavity. Beginning at the iliac crest, the sigmoid generally arches upward and to the right across the abdomen to the right iliac fossa, where it forms one or two coils and then passes down in the right pelvis into the pelvic cavity. When, to remedy imperforate anus, it is necessary to form an artificial anus, it is important to remember that, although the iliac colon is in the left iliac region, the sigmoid usually lies on the right side. The sigmoid joins the rectum at an angle which may be sharp or obtuse, and there is no way of determining this angle except by inspection.

RECTUM.

The rectum is continuous with the sigmoid colon and ends below in the anal canal. It is about 5 inches long, and rests in the hollow of the sacrum, from the level of the third sacral vertebra to a little below the tip of the coccyx and just behind the apex of the prostate gland. At this point the bowel bends sharply backward and becomes the anal canal. At its upper end the rectum is narrower than the sigmoid, but toward its lower terminus it is dilated to form the rectal ampulla. .

Viewed from in front, the rectum is seen to be regularly folded from side to side in a zigzag fashion, which results from the arrangement of the longitudinal muscle fibers. In addition to supporting the feces, these foldings greatly increase the capacity of the rectum without unduly dilating the tube.

These lateral sacculi may be greatly modified by disease. In atony of the rectum, where the organ has been greatly distended, these dilations may be true diverticuli. In other cases, where chronic rectitis has existed, the organ may be contracted to a narrow tube.

The anteroposterior curvatures are very marked; backward as the rectum lies in the hollow of the sacrum, forward as it follows the sacrococcygeal curve, and, finally, backward again at the anal canal. Knowledge of these curves is important when introducing the finger or instruments into the rectum. The curves vary in degree in different individuals, and may be greatly increased by tumors, a displaced uterus, or pelvic adhesion. When the rectum is empty, it occupies only a small portion of the posterior division of the pelvic cavity in the median plane, and at each side, between it and the lateral wall of the pelvis, is a large fossa (the pararectal fossa), which, when the bowel is empty, contains portions of the small intestine or the sigmoid. When the rectum is filled, its lateral flexures become more marked, and the gut passes out beneath the peritoneum, obliterating the pararectal fossa, and fills the greater part of the pelvis. Sometimes at the abrupt curve at the junction of the rectum with the anal canal a knuckle-like projection presents immediately above the canal, as if the bowel were doubled back upon itself at this point. A distinct pouch may dip down in front. This more commonly occurs in multipara, and is evidently due to a relaxed condition of the pelvic structures, and the loss of support afforded by the perineal body to this part of the gut, and to the great capacity and shallowness of the female pelvis.

At this junction of the sigmoid and rectum is an aggregation of circular fibers on the concave surface of the gut, which fibers spread out on the sides and convexity of the bowel and have been called the third sphincter. It is said that the contracture of these fibers

will constrict the gut at this point. As these fibers encircle but a part of the lumen of the bowel, and do not go entirely around, they cannot be considered as a real sphincter.

The peritoneum covers the front and sides of the upper two-thirds of the rectum, lower down the peritoneum is attached only to the anterior wall of the rectum, and is finally reflected onto the seminal vesicles in the male, forming the rectovesical pouch, and on to the posterior vaginal wall in the female, thus forming the cul-de-sac of Douglas. The lower portion of the rectum has no peritoneal covering. The greater part of the rectum lies behind or beneath the peritoneum. The level at which the peritoneum is reflected to the anterior viscus is of considerable surgical importance in excision of the rectum. This reflection is about 3 inches from the anus in the male and about $2\frac{1}{4}$ inches in the female, so that it is not desirable to remove more than 2 inches of the entire circumference of the bowel for fear of the risk of opening the peritoneum. When, however, the disease is confined to the posterior surface of the rectum, or extends farther in this direction, a greater amount of posterior wall of the gut may be removed, as the peritoneum does not extend on this surface to a lower level than 5 inches from the margin of the anus. If a more extensive operation is done, and the peritoneal cavity is necessarily opened, the opening is plugged with gauze until the operation is completed, and then the edges of the wound in the peritoneum are accurately approximated with sutures. In any rectal or perineal operation, anomalies of these culs-de-sac are to be anticipated. Tuttle reports a case where the peritoneal reflection was separated from the perineum by only the thickness of the external sphincter muscle.

The rectum is surrounded by a dense tube of the fascia endopelvina, which is fused posteriorly with the fascia of the sacrum and coccyx. This fascia surrounds the bowel like a net covers a gas balloon, and allows the viscus to distend.

In its upper portion the rectum is separated from the sacrum, and in the intervening space are the superior hemorrhoidal vessels, the left sacral plexus of nerves, and the left pyriformis muscle. Lower down the rectum is firmly attached to the sacrum by dense fascia, but it is not in contact with the bone. In the loose cellular tissues on either side of the rectum are the lateral sacral artery and the hypogastric plexus of the sympathetic. As the rectum leaves the coccyx there is an interval, the retrorectal space, which is filled with cellular tissue. The loose connective tissue around the rectum is sometimes the site of an abscess, the active focus of which may be located elsewhere. This form of abscess is above the pelvic diaphragm, but beneath the peritoneum, and is described as a superior pelvirectal abscess. The acute variety is generally due to ulceration or perforation of the bowel (possibly produced by a foreign body)

above the level of the levator ani. The abscess may also occur above a stricture (simple or malignant) of the rectum, and more rarely follows abscess of the seminal vesicles. Chronic abscess may also appear in region from caries of the sacrum, or from caseation of the presacral lymph nodes, or by downward burrowing into the pelvis of abscess from disease of the anterior surfaces of the bodies of the lumbar vertebræ.

<div align="center">ANAL CANAL.</div>

This is the terminal portion of the bowel and begins at the tip of the coccyx, is directed downward and backward, and ends at the anus. It is 1 inch to 1½ inches long. It forms an angle with the rectum. It has no peritoneal coat. It is surrounded by the internal sphincter, while the anus is surrounded by the external sphincter. These two muscles keep the lumen of the canal closed. The levator and muscles hold the anal canal in its place in the pelvis. The anus, the lower orifice of the intestine, is formed of skin containing numerous sebaceous and suboriparous glands and long hairs. While the anus is closed the external skin is thrown into radial folds by the contraction of the external sphincter, and appears as an anteroposterior slit.

<div align="center">WALLS OF THE RECTUM AND ANUS.</div>

Muscles.—The longitudinal fibers of the muscular coat of the colon are arranged in three flat bands, each about half an inch wide and named from their location the mesocolic, the omental, and the free longitudinal bands. In the sigmoid these bands become scattered, and in the rectum they spread out and form a layer which completely encircles the bowel, but is thicker anteriorly and posteriorly than it is laterally. Two bands of smooth muscle fibers arise from the second and third coccygeal vertebræ, and pass downward and forward to blend with the longitudinal fibers of the anal canal. These are the rectococcygeal muscles. The circular muscle fibers of the colon are very thin, and are accumulated in the intervals between the sacculi. In the rectum they constitute a thick circular layer, and in the anal canal they become numerous and are the internal sphincter. The constant contraction of the sphincter muscle is a factor in preventing ischiorectal abscess from healing, and thus contributes to the formation of a fistula. The reflex contraction of this muscle is the cause of the severe pain of fissure in ano.

The mucous coat of the colon is smooth and pale, but in the rectum it is thick, dark-colored, vascular, and loosely attached to the muscular coat, and, therefore, more mobile than is the mucosa of other parts of the intestinal tract, and hence it slides in all directions. The rectal mucosa contains many muciparous glands, be-

tween which glands is a fine trabecular network called lymph-paths, whose function is the absorption of the fluid contents of the bowel through the epithelium or through the intervening spaces.

When the lower rectum is contracted, the mucosa is thrown into longitudinal folds which are effaced by each distention of the gut. There are also permanent horizontal folds of the mucosa, containing some circular muscle fibers, two to four in number, semilunar in shape, known as rectal or Houston's folds or valves. The largest and most constant of these is situated on the anterior wall of the rectum at the base of the bladder, a second is on the left side of the rectum about the middle of the sacrum, and another is found on the right side up near the commencement of the rectum. Their attachment to the rectal wall is not horizontal, but slightly higher on one side than on the other, making an inclined plane, which contributes to the easy passage of fecal matter over them. Their use seems to be to support the weight of fecal matter and prevent its urging toward the anus, where its presence always excites a sensation to evacuation.

In the anal canal the mucous membrane is smooth, shiny, and glossy. It contains few glands and blood vessels, but is richly supplied with terminal nerve ends. The lower anal canal is covered with stratified squamous epithelium. At the upper border of the anal canal where it meets the rectal ampulla the mucous membrane is thrown into longitudinal folds, the anal column or columns of Morgagni. There are five to ten of these folds, each about half an inch long and each containing some muscle tissue. These columns are more conspicuous as the sphincter contracts. The grooves between the columns end in the anal valves or pockets called crypts of Morgagni.

In some individuals there is scarcely any depression, while in others a veritable sinus exists behind the valves. They are more accentuated on the posterior anal wall, a fact considered by Ball to account for the greater frequency of fissure on the posterior wall of the anus. Occasionally small masses of fecal matter or foreign bodies lodge in the crypts and occasion much local and reflex disturbance. The function of these valves is unknown. They almost entirely disappear when the anus is distended.

These crypts are just above the mucocutaneous junction, which is evidenced by the white line of Hilton. At this mucocutaneous border are five to eight dentations, raised above the adjoining surface, and surmounted by papillæ. Andrews considered these papillæ to be tactile organs endowed with a special rectal sense. They are not ordinarily noticeable on a rectal examination, but when well developed are often very sensitive to manipulation and cause many reflex disturbances. The epithelial layer of the rectal mucosa con-

sists of columnar epithelium, which changes to stratified squama in the anal canal.

The submucous tissue of the rectum is a loose alveolar network, which is thicker and more elastic there than elsewhere in the bowel. In this coat are the blood vessels, lymphatics, and nerves. Sometimes this layer becomes hypertrophied and changed into fibrous tissue.

Blood Vessels.—The inferior mesenteric artery supplies the sigmoid through its sigmoid branches and also the upper part of the rectum through the superior hemorrhoidal branches. The lower part of the rectum is supplied by the middle hemorrhoidal from the internal iliac, and by the inferior hemorrhoidal from the internal pudic and the middle sacral artery.

The superior hemorrhoidal artery, as the principal artery of the rectum, is the continuation of the inferior mesenteric; it divides into two branches, which descend on either side of the rectum to within 5 inches of the anus; here they split up into six branches, which pierce the muscular coat of the rectum and descend between it and the mucous membrane in a longitudinal direction, parallel with each other as far as the internal sphincter, where they anastomose with the other hemorrhoidal arteries and form a series of loops around the anus.

The inferior hemorrhoidal artery rises from the internal pudic as it passes above the tuberosity of the ischium. Crossing the ischiorectal fossa, it is distributed to the muscles and integument of the anal region.

One or more small branches of the middle sacral artery reach the posterior surface of the rectum and are distributed to the muscular coat. The superior and middle hemorrhoidal arteries anastomose freely in the hemorrhoidal plexus of the submucosa. The superior hemorrhoidal artery supplies both the muscular and mucous coat in the upper part of the rectum, but the muscular coat in the lower rectum is supplied by the middle and inferior hemorrhoidal vessels only. ·

The veins of the rectum and sigmoid correspond to the arterial tree, beginning in the plexus of vessels surrounding the anus. These anal veins join others and ascend in the columna rectalis. In the vessels of this plexus are saccular dilatations, just within the margin of the anus, varying in size up to that of a small pea, which are said to be the starting points of hemorrhoids. From this plexus six veins of considerable size are given off, which ascend between the muscular coat and unite to form the superior hemorrhoidal vein, which empties into the inferior mesenteric tributary of the portal vein. This arrangement is called the hemorrhoidal plexus. It surrounds the rectum and communicates in front with the vesicoprostate plexus in the male and with the uterovaginal

plexus in the female. It anastomoses with branches of the middle and inferior hemorrhoidal veins at its commencement, and thus links together the systemic and portal circulations. The inferior hemorrhoidal veins empty into the internal pudic.

The middle hemorrhoidal vein joins the internal iliac, and the superior hemorrhoidal vein forms the commencement of the inferior mesenteric vein, a tributary of the portal vein.

The veins of the rectum run upward in a longitudinal direction for 5 inches in the submucous tissue, and do not get support from surrounding structures, as do veins in other parts of the body. They are, therefore, less able to resist increased blood pressure, and are more easily varicosed. At this upper limit they pierce the muscular coat of the bowel, and may be constricted at this point by the contraction of the muscular wall of the gut. There are, furthermore, no valves in the superior hemorrhoidal veins. The blood vessels of the rectum, being placed in a dependent position, are influenced by the erect posture (either sitting or standing) and are liable to be pressed upon and obstructed by hardened feces. This anatomical arrangement explains the tendency to the occurrence of hemorrhoids.

Nerves.—The nerves of the rectum are partly from the sympathetic and partly from the cerebrospinal system. The sympathetic fibers are derived from the inferior mesenteric plexus, through the superior hemorrhoidal nerve and the corresponding plexus, and from the upper and lower divisions of the hypogastric plexus. The reflex center which governs the action of the sphincters and the muscular fibers of the rectum (defecation center) is situated in the lumbar cord, and appears to be capable of carrying out the whole act of defecation, even when separated from the brain.

The pudendal plexus is intimately knit with the lower portion·of the sacral plexus. It lies on the posterior pelvic wall, and is formed by branches of the second and third sacral nerves, the whole of the fourth and fifth sacral nerves, and the coccygeal nerve. The pudic nerve, from the second, third, and fourth sacral nerves, gives off before its division the inferior hemorrhoidal nerve. Sometimes this inferior hemorrhoidal nerve originates separately from the third sacral nerve. It crosses the ischiorectal fossa, with its accompanying vessels, toward the lower end of the rectum, and is distributed to the external sphincter and the integument around the anus.

Muscular branches from the fourth sacral supply the levator ani, coccygeus, and external sphincter. The branches to the levator ani and coccygeus enter their pelvic surfaces; that to the external sphincter pierces the coccygeus, or passes between that muscle and the levator ani to the sphincter. Cutaneous branches of this sphincter nerve supply the skin between the anus and coccyx.

The obturator nerve does not contribute fibers to the intestinal canal, but, rising from the second, third, and fourth lumbar nerves, it runs along the lateral wall of the pelvis to the obturator foramen. In this situation it may be pressed upon by tumor, cancer, or hardened feces impacted in the sigmoid colon, thus causing pain in the *knee*. The left obturator nerve is more frequently affected. Accumulation of feces in the rectum may cause pressure on the great sciatic nerve in its course through the pelvis and give rise to sciatica.

The great plexuses of the sympathetic are aggregations of nerves and ganglia, which contain not only sympathetic fibers derived from the ganglia, but also fibers from the central nervous system, which are conveyed through the white rami communicans. From them are derived the branches which supply the viscera.

The inferior mesenteric plexus is derived chiefly from the left side of the aortic plexus. It surrounds the inferior mesenteric artery, and divides into a number of secondary plexuses, the left colic, sigmoid plexuses, which supply the descending and sigmoid colon, and the superior hemorrhoidal plexus, which supplies the upper part of the rectum and joins in the pelvis with branches from the pelvic plexus.

The pelvic plexuses supply the viscera of the pelvic cavity, and are situated at the side of the rectum in the male, and at the sides of the rectum and vagina in the female. They are formed by a continuation of the hypogastric plexus, and by branches of the second, third, and fourth sacral nerves, and the first and second sacral ganglia. At the points of junction of these nerves small ganglia are found. From these plexuses branches are distributed to the rectum. They accompany the branches of the internal iliac artery.

30 North Michigan Avenue.

LARGE OVARIAN CYST WITH PENDULOUS ABDOMEN.

By CLIFFORD U. COLLINS, M.D., Peoria, Ill.

In the early days of abdominal surgery in the United States the removal of ovarian cysts was among the first operations performed, and the removal of very large ovarian cysts was not uncommon. In these days of modern surgery and enterprising surgeons, ovarian cysts are not usually allowed to attain any great size before being removed. By a combination of circumstances in the case reported below, the tumor had not been disturbed and had attained a very unusual size. It also presented some problems which seemed to justify recording it.

I first saw the patient, Mrs. H. W., on September 12, 1905, in consultation with Dr. Geo. U. Washburn. She was then 39 years old. She had begun menstruating at 10 years old, was regular every four weeks for three years, and flowed seven days with severe pain. After three years the menstruation ceased for a year, and then reappeared regularly until she was 27 years old, when she noticed a tumor in the right lower abdomen as large as her fist. For two or three years after this she menstruated every two or three weeks and flowed profusely, sometimes for one or two weeks. At the time I saw her she had menstruated every four to six weeks for a year, and flowed from three to seven days. Attention is called to the irregular menstrual history because of the evident lack of balance between the functions of the ductless glands at that time.

She had had two pregnancies, one terminating in a premature birth at 7 months and the other child dying in infancy. She always had severe pain at her menstrual periods. Ever since the tumor had been discovered, twelve years before, she had more or less constant pain, beginning in the lumbar region and going around each side to the abdomen. This pain had been so severe that she had to have morphine each day for about a year. She said the tumor seemed to contract and relax like labor pains at times. On examination the abdomen was enormously large and protruded in front. There was no pendulous condition at that time. The abdomen was flat on percussion, and fluctuation was easily felt. A very large ovarian cyst was diagnosed, and its removal was advised. The advice was taken under consideration, but declined. She claimed afterward that an elderly physician in the neighborhood advised her not to have it removed because the fatty layer of the abdominal wall would probably not heal. As she did not want a "running sore" the remainder of her life, she declined an operation.

I saw the patient again on September 18, 1917, or twelve years afterward. She was addicted to the use of morphine, and took large quantities each day. She was then 52 years old, and had ceased to menstruate at 42. After menstruation ceased, the tumor did not get any larger, but gradually sagged down until it hung down over the thighs and extended to the knees (Figs. 1, 2). The umbilicus cannot be seen in the picture because it was on the lower end of the mass. It seemed as if there had been more stretching of the

Fig. 1.—Before operation. Side view.

abdominal wall between the umbilicus and the costal margin than between the umbilicus and the symphysis, but this may have been more apparent than real. I am sorry that I had not heard the paper of McLean[1] at the time of the operation, so that I could have determined whether the stretching of the abdominal wall was just below the semi-lunar folds of Douglas, as he claims it always is in pen-

[1] "The Extreme Pendulous Abdomen and Its Surgical Treatment by a New Three-Flap Operation." Neil John McLean (Western Surgical Association Transactions, page 49).

dulous abdomens. Of course, this was an unusual case of pen-
dulous abdomen. She also had a goiter, which can be seen in the
picture.

It had now been twenty-five years since the patient had first
noticed the tumor, and she was tired of carrying it and was willing
to have it removed. While we expected dense adhesions, the removal
of the large tumor would probably not present very many special
difficulties, but how to get rid of the large pendulous abdominal

Fig. 2.—Before operation. Front view.

wall was a special problem. Evidently the usual longitudinal in-
cision would not suffice. The day before the operation the abdominal
wall was punctured with a trocar at three points. The first removed
a very thick muddy fluid, and the other two a thick clear fluid.
Evidently the cyst was multilocular. About 8 gallons of fluid were
removed, which reduced the bulk of the tumor and made it a little
easier to handle.

Operation.—September 19, 1917. A hypodermic of scopolamin

1/100 gr. and morphine 1/6 gr. was administered one hour before the operation in addition to her habitual dose of morphine. The anesthetic was gas and oxygen preliminary to ether by the open method. A transverse incision was made from the crest of one ilium to the other through the skin and fat (Fig. 2). The skin and fat were dissected from the aponeurosis below the incision for 4 inches. The attenuated aponeurosis, muscle, and peritoneum were then cut transversely (see dotted line in Fig. 2).

The tumor was found to be a large multilocular cyst of the right

Fig. 3.—After operation. Partial front view.

ovary. The pedicle was cut and ligated, adhesions separated, and the tumor removed. The remaining pelvic organs seemed normal and were left. The posterior portion of the pendulous abdominal wall was cut transversely through all its layers, and this removed all excess of abdominal wall. The lower edge of the incision was sutured to the upper edge of skin and fat, thus overlapping from below upward for 4 inches the aponeurotic, muscular, and peri-

tonitic layers. The upper edge of the aponeurotic, muscular, and peritonitic layers were sutured to the under surface of the lower flap with tannated catgut, and the lower edge was sutured to the anterior surface of the upper flap in the same way.

The dark color of the skin of the lower part of the abdominal wall seen in Fig. 3 was caused by pigmentation. Before the tumor and pendulous abdomen were removed this portion of the skin covered a portion of the posterior wall of the pendulous abdomen, and was sprayed with urine at every urination. As a result the skin became very thick and pigmented.

The excess of abdominal wall was cut off on the theory that a little too much remaining abdominal wall would be better than not enough, with the result that after the operation the patient's abdomen was somewhat larger than necessary (Fig. 3). Again, I am sorry I had not heard McLean's paper at the time of operation, as I feel certain that his method of treating the abdominal wall is better than the one I adopted.

Her recovery was uneventful, and she left the hospital on October 12, 1917. There was a small amount of excess fat and skin in the lower portion of the abdominal wall. When she stood up, this hung over the symphysis and became edematous. She was advised to have this removed, but preferred to go home and return at a later date. While she was in the hospital she had been cured of the morphine habit. When she entered the hospital she weighed 200 pounds, and when she left she weighed 125 pounds, and we therefore roughly estimated the weight of the tumor and pendulous abdominal wall at 75 pounds.

Postoperative History.—March 18, 1918. The patient reported in person, and said that since the second week after going home she has had painful and swollen hands. The thyroid gland has increased enormously in size since the operation. Her fingers feel stiff, and she says the nails become blue at times. There is also swelling of the legs and ankles. She has hot flashes, with headache and dizziness. She was instructed to take thyroid extract.

October 5, 1918. The patient reported in person today. She now weighs 267 pounds. She has not taken the thyroid extract very persistently. The thyroid gland is somewhat decreased in size. Her hands still have the typical appearance of myxedema. She was directed to take large doses of thyroid extract, and was also given iodine. She was requested to report each month, so that we could be advised as to her condition.

November 1, 1918. The patient reported that she had lost 10 pounds and was feeling better. There was a small hernia, about 1 inch in diameter, at the left end of the incision.

INTESTINAL OBSTRUCTION CAUSED BY ADENOCARCINOMA OF THE SIGMOID IN A BOY OF NINETEEN.*

By W. HOWARD BARBER, M.D., F.A.C.S., New York.

This case is reported on the assumption that adenocarcinoma of the sigmoid is very uncommon under the third decade and comparatively unheard of under 20 years of age.

Fig. 1.—Adenocarcinoma of the sigmoid colon in a boy aged 19 with symptoms covering one year. Note tumor divided and small lumen of colon.

The subject is a boy aged 19, entering the hospital on January 1, 1918, with symptoms of acute intestinal obstruction. His mother had died of intestinal cancer in middle life. For the past year he had suffered from intestinal cramps, but had kept at his work until the past two weeks. He had always been constipated, but had never had pain when the bowels moved until the past year. He
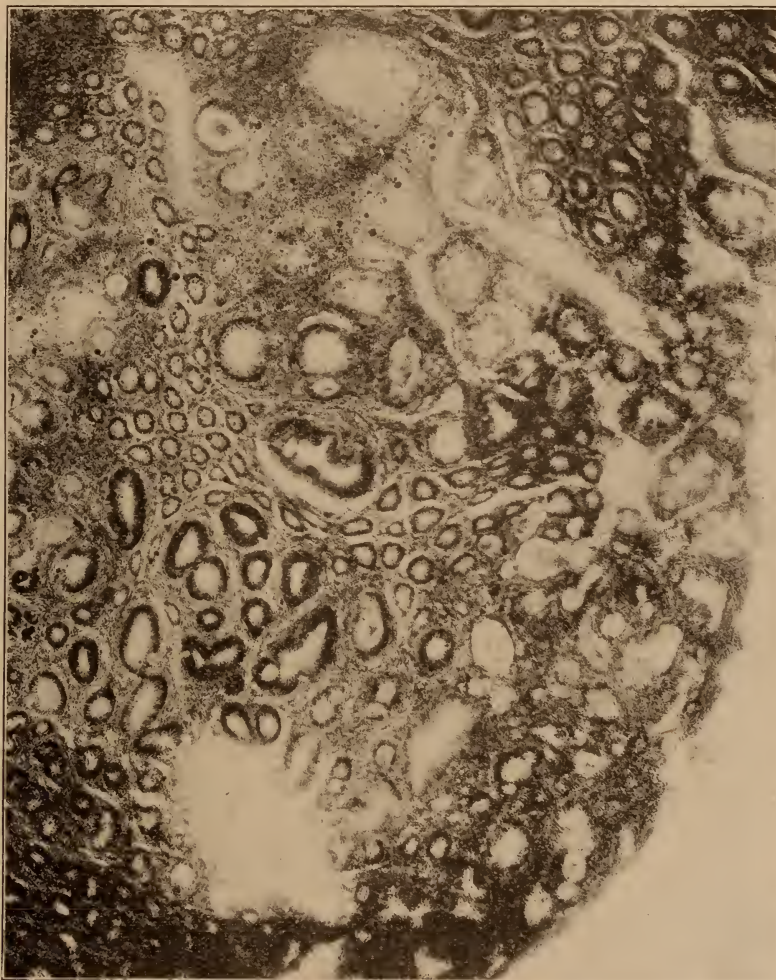
Fig. 2.—Photomicrograph of adenocarcinoma of the sigmoid. Sectional view.

vomited persistently two days before entering the hospital. There was no blood found in vomitus nor in colonic washings. His abdomen was markedly distended, generally rigid and tender, and especially so to the left and below the umbilicus.

The abdomen was entered through a lower midline incision. A large indurated mass, involving the upper extremity of the sigmoid colon, at once presented itself, with extreme distention of the intes-

tine above it. There were adhesions about this mass. There was extensive glandular metastasis in the mesosigmoid and upward in the preaortic lymphatics. Realizing that complete excision was impossible, excision of the sigmoidal tumor and of the regional nodes was accomplished in the hope that the condition might eventually prove to be inflammatory. The divided ends of colon were united by terminal anastomosis.

Microscopical examination of the specimen, as represented in the accompanying photograph, showed typical carcinoma. The gross specimen is shown in section.

The boy left the hospital in his fourth week and reported repeatedly for observation. He was temporarily improved, but has since lost weight and strength, and is undoubtedly suffering from metastasis.

THE HISTORICAL DEVELOPMENT OF PUBLIC PROVISION FOR THE DISABLED SOLDIER.

By DOUGLAS C. McMURTRIE, New York,

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Historians have done very little to lift the veil that covers the fate of the disabled soldier of ancient times. In view of the limitations of primitive medical and surgical science, and of the custom of dispatching the enemy wounded after the field had been won, there is every reason to believe that it is a bloody veil. It is recorded, however, that ancient Athens fed its disabled soldiers at the state's expense, and that Rome under Augustus paid for the keep of its disabled legionaries out of public funds. Veteran legionaries were often provided for by grants of settlements on the frontiers of the empire.

During the Middle Ages, when warfare was on a feudal basis, only those sufficiently well off to equip themselves took part in military enterprises; they were relatively few in number, and usually able to care for themselves in the event of permanent disability. At the time of the Crusades Philip Augustus of France entertained the project of a hospice for disabled soldiers. The Pope congratulated him on his plan, and endowed the institution in advance with certain privileges. St. Louis of France, returned from the Crusades with his shattered hosts, did actually establish an asylum for some 300 soldiers blinded by "the Asiatic sun." In most cases, however, the disabled soldier was thrown on private charity for support. This duty devolved on the lord who had brought his vassals to the king and on the monasteries.

With the crumbling of the feudal system, and the development of standing armies during the fifteenth century, the professional soldier came into being. And from that time on the disabled soldier was a recognized type.

How was he provided for? For a time shift was made with the dispensation of private charity, monastic and otherwise. Supplied with the proper credentials, the disabled soldier would present himself at a monastery, and, after promising to obey the rules and to wear the garb of the institution, he would be admitted as a lay-monk. Few, however, found the life endurable. A French writer of the sixteenth century described the conditions in these terms: "Once the poor soldier is received [into the abbey], he may not abide a fortnight before most of the monks, deriding his hardships, his

perils, his wounds, . . .   do put so many obstacles in his path that he is fain to compound for a pension of 50 or 60 livres and betake himself elsewhere." Departing, the soldier would sell his annuity for a trifle, which he would spend on drink, speedily lapsing into the ranks of beggars and cutthroats with which the countryside was infested.

In England, with the expropriation of the monasteries, the disabled soldiers were thrown wholly on the charity of their leaders. In Queen Elizabeth's time the captains of forces in Flanders complained that they were expected to make provision for the sick and wounded, "whose charge lay heavily on them." The queen was "troubled whenever she took the air by these miserable creatures." Toward the end of her reign steps were taken to provide for "maimed, hurt, or grievously sick soldiers," but little good was accomplished.

From this point on, in the interests of clearness, it will be advisable to first trace the history of the care of the disabled soldier in France and then to return to England, and then to review the provident measures as they were developed in America. Italy and Germany, politically disorganized in great measure down to the latter half of the nineteenth century, have little to offer that is interesting until we come to very recent times. In France, then, toward the end of the sixteenth century, after the close of the civil wars, the problem finally became acute. A multitude of crippled and broken soldiers appealed to the victor, Henry IV., for the "means to live at ease the rest of their lives." They were all ruined men, they said, because either they had several times endured capture by the enemy and had been obliged to ransom themselves, or else they had been wounded and had expended their worldly goods for medical treatment. "They had been reduced to beggary, a shameful thing for the military order." The king was touched and, after considering various expedients, hit on the idea of providing a hospice for the war disabled. To this end he took over an asylum that had been established for orphans who were to become apothecaries, changed its name to the *Maison Royale de la Charité chrétienne,* and decreed that the institution was to be supported by all the excess revenues that could be found in the budgets of the charitable institutions—chiefly monastic—in France. To gain admittance, the wounded soldier had to present a certificate from his captain or colonel stating how long he had served, the "combats, perils, and hazards he had been exposed to," his "valor," and in what "military actions" he had been wounded.

Unfortunately, however, the commissioners of the institution were unable to collect a single livre from the administrators of the charitable institutions in France. Their budgets, so the administrators declared, contained no surpluses. In a few years the institution

was practically defunct.   In 1611 Louis XIII., successor to Henry
IV., closed the doors of the *Maison* and returned it to the embryonic
apothecaries.   The disabled inmates who had survived were pen-
sioned, and very liberally.   But only for a little while.   The need
for state funds soon operated to reduce the annuities.   The pen-
sioners complained.   "We receive," said they, "a mere alms, both
odious and repugnant to the deserts of our quality, for the most part
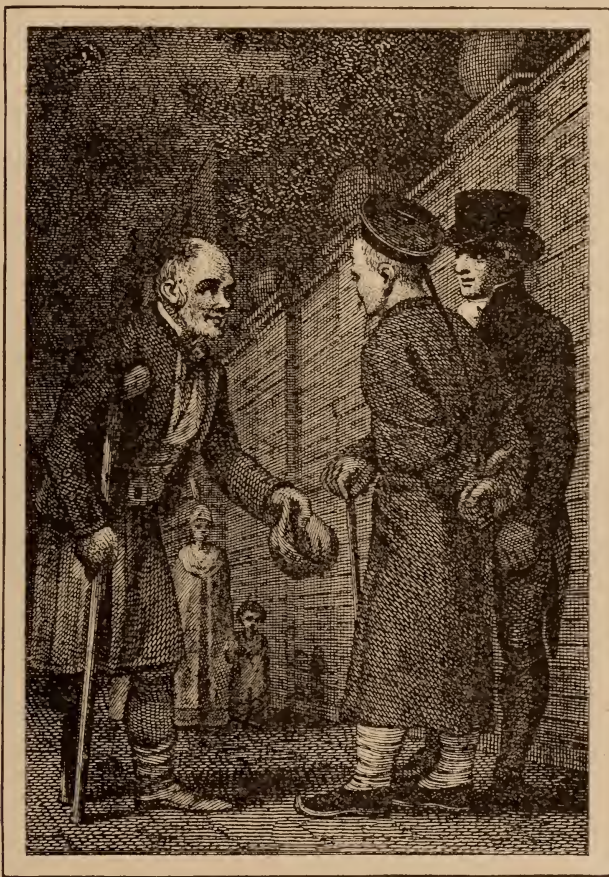
The disabled sailor stops to talk with the English essayist, Oliver Goldsmith.
From an engraving by P. Maverick.

gentlemen, captains, and men full of honors and courage."   The
pension system was revised.   Again the monasteries were drawn on
for funds.   Each monastery was to support its quota of disabled
soldiers.   But the pension was inadequate, the red tape and trouble
involved in collecting it were interminable.   Before long most of
the soldiers had sold their pension rights, and again the countryside
was terrorized by wandering beggars, thieves, and cutthroats.
Convinced of the defects of the system, Louis XIII. abandoned it,

and took up the institutional idea his father before him had essayed. He planned generously, and undertook construction in 1633. This new venture was destined to be the prototype of the famous *Hôtel des Invalides,* the idea of which is usually attributed to Louis XIV. Very little is known of the history of the institution thus established by Louis XIII. In 1646 an official report declared that the building lodged only a gatekeeper, a pothouse, and the architect who had designed the structure; nowhere was there a soldier to be found. Doors and windows gaped, and the roof leaked. In 1656 the building was given to the general hospital of the Salpêtrière, which used it for the aged poor, as a madhouse, and as a prison.

Louis XIV. returned to the pension system, combining with it the plan of appointing the less severely disabled to garrison duty in the frontier towns. But there these unfortunates were so badly off that they declared "they had rather beg than submit to the posts that had been assigned them." The old abuses and disorders reappeared. In order to curb them, the king ordered that all disabled soldiers caught begging in the city of Paris were to be hanged; whoever gave them alms was to be fined 100 livres. All to no purpose. The situation became critical; to solve it, Louis XIV. revived the institutional idea.

The establishment, like everything else undertaken by Louis XIV., was on a magnificent scale. It was to house 4,000 pensioners. The king resorted to the monasteries for funds, but the yield was inadequate. In 1682 he decreed that on every livre that was spent for military purposes a tax of two deniers, later raised to three, was to be contributed to the support of the soldiers' home. During the war of the Spanish Succession this sum amounted to 1,250,000 livres a year. The future of the institution was secure. All in all, measured by the ideals of its time, this latest venture was a great success. In the fourteen years between 1676 and 1690 over 5,000 soldiers applied for admission; during the next fourteen years, over 10,000.

A brief description of the *Hôtel des Invalides,* as the institution was called, is desirable, for there can be little doubt that it served as the inspiration, if not the model, for the soldiers' homes that were later established in most civilized countries. The superannuated and the infirm constituted the majority of the population of the Hôtel. On the eve of the Revolution, over a century after its establishment, out of 3,000 inmates, 1,107 were old men between 70 and 92 years of age, 1,488 had suffered amputations or were otherwise wounded, decrepit, or infirm, of whom 72 were provided with wooden legs, 62 were one-handed, 4 minus both arms, 203 blind, 2 with silver noses, 129 on crutches, 185 helpless, and 68 idiots. The house was organized first and foremost for the care of the aged and the sick. More than half the personnel spent all their days in the

infirmary, looked after by sisters of charity. A comrade was assigned to each man who was helpless enough to need constant assistance, the former receiving a special allowance for his pains.

The officers ate apart in special dining-rooms; the privates ate in two "shifts" in four great refectories. Food was good and plentiful, including daily portions of meat, bread, and wine. The institution provided uniforms and shoes, and a pittance of 15 sous a month. The discipline was military; the Hôtel was like a garrison. There were special police, gatekeepers, sentinels. Everything was done to the roll of drums. Severe military rule was supplemented by a moral discipline, which provided for compulsory attendance at Sunday services, and heavy penalties for infractions of the rules against swearing, intoxication, fisticuffs.

Amusements were rather limited, except for card games and skittles. Some of the inmates worked little gardens. They were all permitted to work in their rooms. The administration even went so far as to provide tools and, for those who cared to learn, instruction in a trade. Those who were married, and whose families lived in the neighborhood, were given frequent permission to visit their wives and children, but no one could marry without the consent of the governor. Certain marks of honor raised the institution above the level of a mere asylum, but personal liberty was greatly reduced, and many were glad to leave after a short stay.

The king was not slow to notice that many of the disabled soldiers could, at a pinch, still render service, notably on garrison duty in frontier strongholds. The Hôtel continued to clothe and feed those who were selected for this service, and gave them pay or half-pay. In 1736 there were 141 of these "detached companies." Those who found life in the Invalides too dull, asked nothing better than to be assigned to this service.

Gradually the custom grew up of granting three years' leave to those who had families and longed to live with them, during which time the Hôtel clothed them and gave them an allowance of at least 100 livres. Soon the three-year leave was extended indefinitely, the allowances automatically becoming pensions. In 1790, in addition to 2,370 disabled men in the institution itself, there were throughout France 26,000 pensioned soldiers. Thus the two principles of institutionalism and pensions—principles ultimately adopted by all the western nations—came to exist side by side in France, continuing down through the nineteenth and into the twentieth centuries. In 1831 the pension system was revised and regulated. The revised law based the pension awards on years of service, on rank attained, and to some slight extent on the seriousness of the disability. This law was still operative when the war of 1914 began.

Today the Invalides is little more than a magnificent war museum.

It did not escape severe criticism even in its palmiest days. Voltaire regarded it as constituting in large measure a source of waste, holding that "the discharged soldier might still labor and follow a trade, and give children to his country." Another French writer, Ardant du Pic, declared: "The Invalides is superb as a bit of apparatus, of ostentation. I wish that the original inspiration had been an impulse of justice, a Christian idea, and not purely one of military policy; nevertheless, the effects are morally disastrous. This assembly of idlers is a school of depravity in which the invalided soldier ultimately forfeits the right to be respected."

The history of the care of the disabled soldier in France is largely typical of the history of this movement in other countries. In most nations the administrative conscience awoke but tardily to an even approximately adequate sense of its obligations both to society and to the individual disabled in the most perilous of social functions. It will be remembered that in England, toward the close of the sixteenth century, Queen Elizabeth took effective measures for the relief of hundreds of soldiers who had been invalided home from Flanders. There seems to be no record of further public action until the time of the Commonwealth, when Parliament made more effective provision, both in the form of pension grants and of soldiers' hospitals and homes, but only for those soldiers who had been disabled fighting for Cromwell. Crippled royalists received no consideration. When these partisan provisions were revoked by Charles II. on his accession to the throne, the hitherto neglected royalist soldiers took advantage of the opportunity to plead for provision, and in 1662 the king approved a measure enabling discharged soldiers to practice a trade without completing an apprenticeship, a measure which provided but sorry relief for those most in need of care—the severely disabled.

In 1682, however, the king, prompted by the need of maintaining a considerable force and inspired, doubtless, by the magnificent example of Louis XIV. of France, issued a decree for the establishment of the Royal Hospital at Chelsea for disabled soldiers. About the same time steps were also taken for the establishment of the Greenwich Hospital for invalided seamen. Both institutions were carried to completion under William and Mary.

Chelsea Hospital was supported chiefly by money compulsorily deducted from the soldiers' pay. Not until the nineteenth century did Parliament provide more generously for the maintenance of the institution. In addition to the relief provided by these hospitals, a pension system was inaugurated shortly after the opening of both establishments, based on disability incurred during service or on infirmity after twenty years' service. Before long the numbers qualifying on this basis had increased so extensively that it was necessary to establish a system of "out-pensioners," organized into

"invalided companies" and liable to special service in time of war. The pension system was subject to great abuses, the pensioners generally receiving but a fraction of the income (small enough in itself) to which they were legally entitled. In 1754 William Pitt reformed the system, "having it much at heart to redeem these helpless unthinking creatures from their harpies."

Early in the nineteenth century Parliament passed an act granting pensions to all soldiers who were invalided, disabled, or discharged after from fourteen to twenty-one years of service. Since then, and especially after the South African War, the system has been generously extended, including relief not only for disabled and retired soldiers, but also for the widows and orphans of those dying in the service.

It is pleasant to be able to say that no nation has hitherto been so generous in its provision for the disabled soldier as the United States of America. In fact, the first relief measures were undertaken very shortly after the founding of the early colonies. Plymouth Colony was founded in 1620; it passed its first pension legislation in 1636, providing that any man who should be sent forth as a soldier and return maimed was to be maintained competently the rest of his life. Eight years later the Virginia Assembly passed a disability pension law, and not long thereafter another law creating a system of relief for the needy dependents of any colonist killed in the service of the colony.

Long before the Revolution other colonies had taken similar measures, Rhode Island not only providing pensions for the disabled and for the dependents of those killed in service, but also decreeing that every wounded soldier was entitled to medical care at the colony's expense until cured.

A few months after the beginning of the Revolution the Continental Congress declared that half-pay would be allowed every officer, soldier, and sailor incapacitated during the war. Since, however, the Continental Congress possessed neither funds nor any real powers, the pension obligations incurred by this and by similar resolutions rested solely on the several states, some of which repudiated them. Several times during the bitter struggle, at critical moments when the outlook was gloomiest and the army discouraged, General Washington appealed to the Congress for more generous pension provisions. The opposition to these proposals was always strong. A provision granting officers somewhat more favorable schedules than those set up for the men was violently denounced as undemocratic.

The first general pension law enacted under the constitution was passed in 1792 and amended the following year. In its amended form it provided that $5 monthly (raised to $8 twenty-three years later) was to be paid all privates and noncommissioned officers

disabled in the service of the Continental army. Incapacitated offi-
cers were allowed half-pay. This measure furnished the model for
the regular army pensions law that was passed in 1802 and which
continued unaltered in its essentials down to the Civil War. At
various times throughout the first half of the nineteenth century
special pension legislation for special groups, such as the widows
of the Revolutionary soldiers, was enacted, the details of which
need not be here discussed. During the Civil War the principle of
fixed rates for specific disabilities—the loss of a hand, the loss of a
foot, both hands, both feet, both eyes, etc.—was introduced, a prin-
ciple which has since found fruitful application not only in military,
but also in industrial, legislation. In 1870 it was enacted that
artificial limbs, renewable every five years at public cost, be pro-
vided.

In general, the tendency since the Civil War has been in the
direction of unusual liberality. There is no need here for recording
this legislation in detail. It is sufficiently well known to everybody
that in some directions the system has been extravagantly extended,
so that, in the words of an American general, "it has come to pass
that those who were merely on the rolls for a few days and the
malingerers and the deserters all march as veterans of the great
conflict."

One other feature, however, deserves mention. This feature is
the state and Federal soldiers' homes. The former number in excess
of thirty, all told; in some of them the wives, mothers, widows,
sisters, or daughters of the beneficiaries are maintained, as well as
the disabled and invalided soldiers themselves. The total number
of individuals maintained in these state institutions is about 11,000.
The Federal institutions are two in number, both situated in the
District of Columbia. One of these, the National Home for Volun-
teer Soldiers, has ten branches in various parts of the country.
The number cared for in the Federal homes has varied between
18,000 and 30,000.

The lot of the industrial worker who is disabled by accident has
in the past been very unfortunate. Up to a few years ago he had
no redress except through the courts, and the employer had many
technical defenses which could be offered. For the most part the
injured man slipped back in the social scale and frequently became
dependent on relatives or friends, or on public charity. Even after
the recent advent of compensation legislation, which has done much
to remedy the injustices involved in industrial accidents, the situa-
tion has not been greatly improved because, while the money com-
pensation went to support the man during the period of idleness
following the accident, it did nothing constructive to put him back
on his feet and to restore him to useful employment. Too often the
man has lived on his compensation as long as it lasted, and, when

it expired, has been forced to appeal to charitable assistance. Amputations and other injuries are great economic levelers, and it has been found in several studies that the skilled worker before the accident has been reduced after it to employment as peddler, messenger, or watchman. In this process a vast deal of potential ability and productiveness has been lost to the community.

This statement gains force when it is considered that in eighteen states alone there are being injured in industry over 750,000 men per year. Over 35,000 of these accidents represent permanent disability, either partial or total. It is estimated by competent authority that the permanent disabilities produced annually through industrial accident in all the states number over 80,000, of which over 2,000 represent total disability and over 28,000 amputation cases.

Up to modern times, therefore, the cripple has been always an object of charity, if not of actual neglect and mistreatment. Public opinion has conceived the cripple as helpless and almost insisted that he become so. Charity has been readily proffered, but almost never the opportunity to make good and get back on his own feet. Educational advantages have been closed to the disabled man; the employer has refused him a job.

Successful cripples are unanimous in evidence to the effect that the greatest handicap is not a loss of limb or other disability, but the weight of public opinion. They have had to fight constantly against it in order to make their way and assume a useful place in the work of the world.

Even the social workers, who have a natural interest in all the unfortunate classes, have been forced practically to give up the crippled man. There have been sporadic attempts in various large cities to operate employment bureaus for the physically handicapped, but in almost every instance the work was given up because it was impossible to get employers to take men and because for disabled men who needed training prior to placement there was no possibility of obtaining for them the requisite educational opportunity.

For decades every indication has pointed to the need of special training facilities for the disabled, but the community has not seen fit to provide them.

CESARIAN SECTION AND OTHER OBSTETRICAL PROBLEMS.

By J. NIEMACK, M.D., Charles City, Iowa.

Of twenty-eight years of medical practice, the first five were spent in Poland, where a couple has from ten to twenty children. The last twenty-two years were spent in prosperous and cultured Iowa, where the birth of a child is an event. One gathers many different impressions, and learns that, if it is the doctor's aim to sustain life, improve health, and help individual happiness, he must take quite different steps in different surroundings to accomplish his purpose.

I am an ardent admirer of the great art of obstetrics, and cannot help feeling sad about surgery's encroachments on her domain. And, still, how can we help it?

There is in my mind the picture of a fine and brave woman, trained nurse, happily married. One day, after years of married life without a pregnancy, she came to me and with bitter tears told her story. She has been subject to occasional epileptic convulsions, is in deadly fear to give this as unavoidable inheritance to a possible child, and, while both she and her husband love children and long for a child, they do not dare to take the responsibility. We finally decided that she should nevertheless try, as her own case was not inherited, but acquired. When her term approached, she told me that this was the one time they would risk it; if the child was not healthy, then never another one.

She was well built, 30 years old, but went considerably beyond her time; the bag of water broke early, and baby's head was to be the wedge for opening a passage. Forceps delivery was the certain outlook.

I suggested Cesarian section for the following reasons: the mother had had attacks about every two weeks during pregnancy, enough to give the child a predisposition. The head was sure to be subjected to great stress with and even before forceps, as it was very large for a late primipara. Death or mental infirmity of baby was sure to destroy all happiness of the house.

After consultation with another physician the operation was declined, and finally a 10-pound boy was living and undamaged, delivered by forceps. He is now 1 year old and apparently healthy. In a similar case I shall give the same advice, for with well-equipped small hospitals everywhere, and in all of them one or two men who love the study of anatomy and physiology sufficiently

well to become efficient surgeons, such obstetrical case, just like the chronic medical appendix, might be handled better by surgery, with the promise of 100 percent for the child and not much less for the mother. If there is to be only *one* child (and this is no exceptional case), why not give it a chance to escape birth traumatism?

Should not the obstetrician be able to say: If the child is alive when I arrive, it shall be alive when I leave? But can he if surgery in obstetrics remains the last resort?

During the last three years I have made eight sections, and there have been in our hospital two others done by other men. Not any had been done in this locality before that time. The fear has gone, as the ten mothers are alive. My own cases made a normal recovery without temperatures or disturbances. This seems due mostly to the circumstance that not more than one or two vaginal examinations (four times not any) had preceded the operation. In placenta previa, where the scene is opened by hemorrhage,[1] and the slightest dislodging of the vaginal clod opens up a new outpouring, what good would an examination do, unless one is prepared to get at once through to the foot for version and tamponade with the leg?

These four cases, two of them nearly exsanguinated, have made absolutely faultless recoveries. All had to be first transported to the hospital, but this fortunately was quite near. One was brought in from the country. She did not flow much (Dr. Miner's case). She claimed to have felt life immediately before the doctor's arrival and again while on the way. But the liquor amnii was already discolored, the child dead, a plum-sized thrombus compressing the umbilical vessels about the middle, and the placenta separated from the uterus by a large clot. Clinically this premature separation of the placenta will hardly ever be diagnosticated from placenta previa. And, then, as long as mothers will imagine they still feel life, can the physician refuse them when they ask to give their child a chance? For if in this "one-child country" the woman has carried a baby to term, she is not willing to lose it with a light heart.

One of the other babies weighed 3½ pounds, and lived through two cold winter months before its life flickered out. A third one had spina bifida of the last two lumbar vertebras. I operated on it after six weeks, following the Mayo method. This girl had no visible paralysis before, and is now, at 2 years of age, a healthy and normal child. Every mother and every living baby was saved in placenta previa. Obstetrical methods cannot equal that record. One mother has a small hernia in the upper end of her scar and all other abdomens are good.

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[1] Two women arose from sleep to urinate and the blood poured from them.

For relatively narrow pelvis I operated twice. The first case was a 34-year-old primipara. After forty-eight hours of labor the head was still above the pelvic entrance, the cervical opening was 1 inch, with weak pains. In the case of the second, aged 31, of the two preceding children, one had died before birth, and the second directly after a very hard confinement. A child was urgently desired by both parents, and they placed the management of it in my hands early in pregnancy for the purpose of bringing them a living baby. Yet, when her regular time passed without beginning of pains, she failed to report. When I finally saw her, the baby's size would have given hardly any chance per via naturales. I put the case before the family, and the two grandmothers decided for operation. Times certainly do move. Just imagine these two old-fashioned German grandmothers voting for section. Both mothers and both babies are strong and healthy.

A diagnosis of eclampsia had been made by the attending physician in the case of a primipara of about 24 years on account of attacks of coma, convulsions, heavy albuminuria, and edema. The patient was at full term, with no signs of beginning parturition. The attending physicians, before calling me in, had informed the father that section was the only way to save the baby and possibly the mother. Recovery from operation was smooth, but the woman remained dull and very fretful. Two weeks after discharge from the hospital she was brought back and died six weeks after the operation under symptoms of pachymeningitis. The baby is growing up in good condition.

My first section was done in the following case: Illegitimate pregnancy of young girl. When called, there were pains and slight bleeding. There was a double vagina, a heavy fleshy septum separating the divisions, and the septum extending clear up to the cervix. A cervical opening appeared at both sides of the septum, and a bent probe introduced at one side became visible at the other. From the size of the uterus the girl could not be pregnant over seven months, probably less; but parturition had begun, and only the best management of delivery had to be considered in consultation. Surgical division of the septum at this time, as well as watchful waiting, promised only a protracted hemorrhage, difficult to control, as the septum would necessarily tear. The baby's life did not need to be considered, so it was decided to empty the uterus by hysterotomy, and later divide the fleshy septum. This was done with satisfaction for all concerned.

So much about these eight cases. All the living mothers are at present in prime condition.

The technic has always been the same. The abdominal incision extended above and below the umbilicus just sufficient to roll out the uterus. One does not generally know whether to enlarge it

upward or downward before trying to force out the womb edge-wise with one hand in the abdomen, while the assistant makes appropriate pressure on the abdominal walls. A towel is spread over the upper part of the incision to protect the intestines. Steadied by the assistant, who compresses the uterine arteries at the same time, the uterus is carefully opened by a transverse incision between the cornua. There is no advance information about the thickness of the walls. It may be thin in one place and quite heavy nearby. When once the gray amniotic sack has come in sight, the fingers are introduced between it and the musculature and the wound ripped open from end to end with the knife. The sack is pricked, and, while the water pours out, the hand is quickly introduced and the child is drawn out by whichever part presents first. No harm can be done.

An extra assistant takes the child, clamps the cord, cuts it, and devotes himself exclusively to reviving and watching the baby. This extra assistant is important because everyone is now very busy. The anesthetist gives the injection of pituitrin, prepared in advance; the surgeon grabs the placenta, which always comes directly under his hand, and, remaining inside of the amniotic sack, endeavors to remove the whole afterbirth in one piece. Should anything remain, only then is the uterus quickly rubbed off with a large gauze pad. If section is done before pains have started, two fingers push down to open the cervix. The bleeding, which is quite free, is neglected at this time. I have never met a spurter in the incision. The assistant now massages and compresses the contracting uterus, and the surgeon closes the incision.

I have always placed three tiers of continuous suture of chromic catgut No. 2, using a long heavy needle without needleholder. The suture should be pulled somewhat tighter than in other tissues to allow for muscular contraction. Why it should be necessary to avoid going through the endometrium is not clear to me. The need is for a broad coaptation. The last tier pulls the peritoneum well over the whole incision. One or two single stitches control the remaining oozing. Then the uterus is squeezed out toward the cervix with a hot towel, the abdomen cleaned of blood, and the uterus dropped back into its place. I have always been fortunate to find the omentum long enough to pull down and place between the transverse incision and bowels. Other adhesions are out of question in this incision, which probably is a valuable point in its favor. As the abdominal wall about the navel region is very much thinned at the end of pregnancy, this region remains the danger spot for postoperative hernia in spite of tier suture. Where time allows, I should advise to free the fascia sufficiently to use imbrication for an inch or two. A retained enema of $NaCO_2$ and glucose is given, and patient placed in a Fowler position as early as possi-

ble. Not much ether has been needed for anesthesia. The after-treatment is nil, just as after regular delivery or laparotomy. The time consumed until full delivery of the child has been from three to four minutes, and the whole operation from twenty-eight to thirty-five minutes.

In future I shall have the pituitrin given as soon as the uterus has been rolled out of the abdomen; on account of the arterial compression by the assistant it did not seem to work promptly enough when given after incision. In this case, of course, the slightest delay of removing the child and afterbirth might be a great source of trouble by firm contraction.

Boldness and absolute confidence in his ability to control hemorrhage after extraction on the part of the surgeon, previous arrangement for every step and emergency for the helpers, hospital surroundings, and strict avoidance of uncalled for examinations by the obstetrician are needed for successful operation. These essentials are now nearly everywhere available. Why, then, should our terrible mortality *intra partum* be allowed to continue? But if every doctor who can remove a chronic appendix, and have the patient survive the "ordeal," will endeavor to perform such operation, it will soon fall into discredit again.

I am not trying to set up as norm for others the indications under which I operated. I have, however, thought out in every case what was the best procedure to meet the individual conditions, and might in cases of very fertile mothers have come to quite different conclusions.

But, whatever may be said about limitation of families, we doctors have to meet facts, not theories. I have no patience with those miseducated physicians who talk loudly about the crime of killing a "possible" child, but are willing to let die by obstetrical trauma one that is fully welcome and ready to be born, and are afraid to act either way.

But, to present the other side of the subject, I shall report two more surgico-obstetrical cases in which children's lives were deliberately sacrificed after long and serious deliberation with my colleagues. Neither laws nor text-books had an answer, and the question what would be the proper thing to do had to be squarely met.

A few years ago I was called in by a neighborhood physician to help in cranial perforation and delivery for narrow pelvis. It was a delayed and most miserable affair, occurring in the county poor house. The case was that of an unmarried, half-witted girl of 22 years, who did not know if she ever had intercourse and acted stupid throughout the procedure. But she finally recovered and went home to her mother. She had one brother somewhat younger, and the county kept the family on a small farm remote

from people to insure against mischief, as the brother was nearly an idiot. Some years later the girl was brought to me by her mother. She was four months pregnant again, and the only possible father was her brother. What was to be done? A supravaginal hysterectomy of the pregnant uterus was finally done. She made a splendid recovery, as do all people for whom nobody cares, is now married, and husband is satisfied.

The reasons for the course adopted were impossible delivery of a living child, undesirable offspring of such union, advisability of sterilization for a girl of such passions and no judgment to balance them. The girl's mother, of course, had to give her consent. There were twins in utero. I had quite a controversy when the rumor of her intended marriage came to the county officials and ministers, but in the end they agreed that, if a man wanted such kind of a wife, it might be best to let him have her in a lawful way. The danger of having babies was eliminated. What would you have done?

And now as to the second case. A 15-year-old girl became pregnant by and contracted gonorrhea of the cervix from the same man. She was three months pregnant when her mother came home from a longer visit and learned the condition. I could, of course, have refused the case, for "am I my brother's keeper?" But somebody would have to attend to the case at the confinement or miscarriage, and somebody had to treat the gonorrhea. That local applications in the cervical canal would bring on miscarriage, sooner or later, could be readily admitted. But would there not be salpingitis after that? Most certainly there would. If the cervical affection be left alone and the full term awaited, what then about salpingitis? In either case sterility would ensue. But how many boys would in the meantime contract the disease? The girl would not have to care, as she had already lost her honor and respect.

We again did hysterectomy, and then speedily cured the gonorrhea. This possible (but possibly blind) baby was sacrificed and the girl permanently sterilized, but was it unchristian, unprofessional, unsurgical? Did we not help in saving more out of this wreck than could possibly have been saved in any other way? Let everyone answer for himself.

The doctor is neither lawyer nor minister, but only a "healer."

MILK-BORNE (?) EPIDEMIC OF SEPTIC SORE THROAT.

By D. M. LEWIS, M.D., New Haven, Conn.

Epidemics of septic throat of provable milk-borne origin necessarily command the close attention of sanitarians, of the medical profession, and of the dairy profession, whether collegiate or mere producer. Presumptively proved ones have not, from my knowledge of the literature on the subject, been further carried to the definite satisfaction to all parties concerned, and cases so completed present points of importance on the spread of disease hitherto unappreciated.

An article on the subject of an investigation of an epidemic stated to be milk-borne is most timely.

The Monthly Bulletin of the State Board of Health of Connecticut for July, 1916, contains the following: "During the month of June an outbreak of septic sore throat, socalled, occurred in Bridgeport and vicinity which resulted in several deaths. Approximately 400 cases were reported, 90 percent of which used the milk from one particular dairy. On investigation it was found that an employee, who handled the bottles at this dairy, had a severe sore throat about the time that the first cases appeared. It was further ascertained that two children on the dairy farm were ill at the time of the investigation with sore throats of similar nature. The milk was not pasteurized, nor were the bottles boiled or sterilized with steam. The milk supply was stopped—the epidemic stopped—is this not a lesson for us all?"

On June 12 two pediatricians of Bridgeport, having an unusual number of sore throats in their practice, one of them called on the telephone a similar specialist in this city, and as a result it was reported to the health officer of this city that, correlated with the condition in Bridgeport, there was an epidemic among the university students and a frequency of similar sore throats in the town of Milford, which could be explained by the common source of the dairy farm Beaver Brook in Milford.

With knowledge that such milk was handled only in this city by a students' grill, that the cases in Bridgeport were stated to be among that class of individuals who took the dairy milk as the best obtainable for children, coupled with the facts mentioned in the state's report, an immediate opinion was rendered to the dairy by the secretary of the State Board of Health and our local health officer that their milk was at fault. Voluntarily stopping their milk supply at the start of the investigation, the dairy officials asked the

bacteriologist of the State Board of Health to examine their milk. This official, the late Prof. Conn, referred them to me. Having given them a clean bill of health as concerning their cattle at the time the investigation was going on, and having both local and state knowledge of our usual communicable diseases, and being in constant touch with daily developments of the investigation, I believed that, while the basis of the report might be a true one, the facts as established did not warrant the conclusion.

In July I was asked by the dairy farm to prove the case. At this time there was obtainable from the health officers of Milford and Bridgeport, after the epidemic was over, the return of the number of cases from physicians. From the physicians of both localities I obtained case reports, with dates; from the dairy a personal investigation of all the families taking their milk, with their illnesses, with approximate dates and sequence, and a survey of an equal number of adjacent families of similar class who did not take their milk, and, lastly, a copy of death certificates for Bridgeport for the month of June. The facts for Milford, a town of 5,000 inhabitants, showed, according to the health officer, that there were about 125 cases stated as beginning about June 10, with few, if any, after July 4. The lists of the two active physicians of the town showed that from the middle of May through June there was a very uniform daily occurrence of sore throats, predominant among adults. From the middle of May until the end of the first week in June there were five times as many children ill with sore throats as during the following three weeks; that over three-fourths of the cases were not on Beaver Brook milk, and that the sum total of the cases was four-fifths of the stated 125 cases. Not only was there at that time in Milford no evidence of any rise or fall of reported or found cases of sore throat at any time period, but there was good evidence of prosodemic spread. Similar statistics for Bridgeport were more difficult to arrange, as but two physicians were willing to give or could give the requested statistics extending over the same period. Their lists show the same predominance of adults over children, and for the same time period as with Milford, on other milk than Beaver Brook. There stood out on their collected data one notable fact—on June 12 there were seen 11 cases in adults and 2 in children on Beaver Brook milk, after which time, on the same milk, there were no further cases, save on June 15, when there were 2 adults and 1 child. With the fairly uniform daily sequence from May 1 until July 10 of cases not on Beaver Brook milk, there was noted no coincident rise among such; in fact, an absence of cases on the two dates mentioned. Approximately 200 case reports were obtained by the health officer over the telephone from physicians in early July. The list of the two physicians mentioned comprised one-third. The other two-thirds could not be

charted, as they did not include dates and other facts. The survey of families, both of those taking Beaver Brook milk and those not, was not sufficiently accurate to chart. With the partial list there was written testimony from physicians that sore throats, to their knowledge, had been frequent for one month before attention was paid to the socalled epidemic. Death certificates showed that May and June had been characterized by deaths from meningitis and septic infections, with diphtheria and cardiac paralyses in children under 5 years, as well as suppurative abdominal processes in adults. The few of these on Beaver Brook milk were very definitely family contact successive infections, and could explain the reported instance of the two days mentioned. With such indecisive data in Bridgeport, those of this city became enlightening. From June 9 until June 21, when the university closed, there were 41 students listed on the registrar's record as having had sore throats. With 2 on June 9, the following eight days gave 6, 9, 15, 3, 2, 1, 1, and on June 20 also 1 case. Statistics for June 12 in Bridgeport and New Haven were apparently similar; absence of such in Milford did not disprove milk infection. With the report of one of the cases by the hospital as scarlet fever, a diagnosis withdrawn later, I went back over the statistics of the students who had had scarlet fever and sore throats during May and during the previous December, when there was a frequency of scarlet fever. Charting these men by residence, the cases of scarlet fever of December, 1915, and May, 1916, were all in five out of twelve dormitories. With the exception of 3 cases among the sore throats in June, all cases were in these dormitories. Further, they were all roommates of or in adjacent rooms to those who had had infection. Of the excepted 3, two were roommates and a third a classmate and living in an adjacent room. I was led to this factor by the testimony of the proprietor of the grill, who stated that only seniors ate at the grill after Easter; of the 41 students mentioned, 15 were seniors, 12 juniors, and 14 sophomores; 4 out of 23 of these students who answered their questionnaires stated that they had never used milk even with other food. A personal letter from one observing individual stated that, while he considered the waiters as needing more investigation than the milk, his judgment of the matter was that the epidemic was the result of the university shutting off the heat from the dormitories on the two days previous, during a time of unusual chilly, rainy days. While not certain, his remembrance was that these days were June 9 and 10. I carried this observation into the city's statistics, and found that from June 10 for one week I had seen a frequency of case reports for adults diagnosed as diphtheria, but proved to be streptococcal. I also had a record of a similar small frequence in two neighboring towns, Hamden

and North Haven, and in all instances there was an absence of milk factors.

On June 28 I examined the employee who had been called the carrier, at that time quarantined as a streptococcal carrier. His history was as follows: hired on June 7, 1916, he washed bottles and helped bottle milk until June 12, when he stayed in bed on account of sore throat. First seen on the 15th by a physician, he was permitted to return to work on the 17th. For five days he had then been confined to his room, but not in bed. Called a case of quinsy, there had been no gland enlargement, no operative interference, nor any natural rupture of any gathering. From the 17th to the 24th, when the milk was stopped, the employee had been milking as well. If a carrier between June 7 and 11, before the onset of the sort throat, there might well be expected, in the circumstances, a not improbable greater carriage during June 17 to 24. There was no evidence even in Bridgeport statistics to strengthen the possible previous connection of Bridgeport and New Haven of the first time period. While a normal throat and absence of streptococci in cultures on June 28 was good evidence against the status of the employee, as at that time held by the State, there could be, in theory, only an imagined condition of carriage before the actual sore throat. Two facts later demonstrated this as untenable. In October, 1916, and early 1917, sore throats and measles, respectively, started up in the university. To the exclusion of other dormitories, the cases were again among the previous juniors and sophomores and their roommates of the previous session. The later history of Bridgeport was also confirmatory. Latter July gave testimony of continued septic sore throats, with an epidemic of a similar nature in the neighboring town of Winsted. During June there had also been one in Binghamton, N. Y. In sum, the apparent possible positive connection of conditions on June 12 for New Haven and Bridgeport, in the absence of such for Milford, could be disproved for New Haven as to milk. The coincident increase of diphtheria, meningitis, and, later, poliomyelitis, in Bridgeport was proportionate to conditions in the other two towns mentioned, North Haven and Hamden, while a proportionate infrequency of all three diseases was to be shown in New Haven. In the case of Hamden there was to be demonstrated an analogous condition of assumed milk-borne infection. A producer who, living in that town, supplied only one family with milk, as contrasted with approximately 1,000 quarts in New Haven, was excluded from his home town by the health officer because the family he supplied had two children ill with septic sore throat. Some of his patrons in this city heard that his milk supply had been shut off and stopped their milk. Having been appealed to by the producer, I took the matter up with the health officer with the result that the order was revoked.

During the investigation I was impressed with one fact which should be studied in the future. The State Board of Health reported that the milk was not pasteurized, the bottles were not boiled nor sterilized with steam. The health officer of this city, on his first visit on June 15, with the farm inspector, rated the dairy at 98. Later on, finding that they had previously given up the use of steam for socalled B-K, the official could not find sufficient words for condemning their dairy. Equally ignorant as that official as to what B-K was, I was much impressed with their generally excellent surgical technic of the entire plant, and the treatment of walls, floors, utensils, and cows' flanks and udders with the solution. Writing to the manufacturers, I found that the solution was a product similar to one now known as Hychlorite, a standard and acceptable article, when a trade name was changed to an indicative one. Not only did their technic explain the usual minimum bacterial count of 2,000, with a single maximum of 65,000 in a long series of counts, but it opened up to me two previously questioned procedures on the part of milk producers. The one was the usual method of rinsing milking machines and tubes with what had once been boiled water. The second was that steam sterilization meant, to the average dairyman, exposure of even his largest containers to steam for only a few minutes by the watch, never in excess of from three to five. As a surgical procedure the latter is not as convincing as the antiseptic treatment; there is an excellent field for investigation of the degree of sterility of utensils and cows of the average user of each method. I have been unable to find that milk or farm inspectors do more than record the fact that steam is used. With a knowledge that the larger part of such is a flash use rather than a holding one, quantitative values should be studied.

The points of importance realized by a searching investigation of a socalled milk-borne epidemic of septic sore throat are two in number. First, that a snap diagnosis increases the irrationality of farm investigation, directly advertising and assisting the Pasteurization Trust Company. Second, and of more import to the public health, it obscures and prevents the demonstration of the interdependence of various respiratory diseases and groups of individuals. Appreciation of such constitutes the basic principle in my experience in controlling the prevailing disease, as well as that of other following diseases hitherto considered as independent. From the indefinite presumed method of transfer of bacteria from an individual, lacking history of and later evidences of clinical commensurate inflammation, without correlated evidence of the milk distribution, a definite contact spread among individuals could be demonstrated when corrected time relations, other than of the immediate period, were taken into account. It is the replacement of the first letter "y" in mystery by the letter "a."

OUR HARMLESS FLOWERS AND HAYFEVER WEEDS.

By WILLIAM SCHEPPEGRELL, A.M., M.D., New Orleans,

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To those who have not experienced its sufferings or observed its effects, hayfever appears an insignificant ailment which often forms a convenient object of ridicule. The hayfever victim, however,

Fig. 1.—Golden Rod. As its pollen is not in the air, it does not cause hayfever, except by direct application to the nostrils. The line drawings of this article are from Britton and Brown's Illustrated Flora of the United States. The photographs are original.

knows it to be a tragedy, to which pneumonia or typhoid fever, with a prospect of a full recovery or a fatal termination, would be preferable. While the frequency of hayfever varies somewhat in differ-

ent localities, most cities of the United States average about 1 percent of their population,[1] so that it is not difficult to compute the number of cases, the total of which is over 1,000,000 in the United States.

Hayfever is due to the inhalation of the pollen of plants, most of which are worthless weeds which are already outlawed from an agricultural standpoint. The fact that some persons are susceptible to these pollens and not others is no more remarkable than

Fig. 2.—Rose. In spite of the summer form of hayfever being called "rose cold," the roses do not cause hayfever.

that many persons cannot eat fish, crabs, and other articles of food which are harmless to others.

Realizing the importance, from a hayfever standpoint, of destroying weeds, or at least preventing them from reaching the pollinating stage, many of the boards of health, both state and municipal, have organized active campaigns against weeds.[2] The public generally

[1]Hayfever: Its Cause and Prevention. Wm. Scheppegrell (Jour. Am. Med. Assn., March 4, 1918).
[2]A Year's Work in Hayfever Prevention in the United States. Wm. Scheppegrell (Jour. Am. Public Health Assn., Aug., 1917).

has supported these efforts, but, in some cases, has hesitated from sentimental reasons, believing that the golden rod, field daisies, and other flowers are included among the hayfever weeds. With a view of correcting this erroneous impression, the United States Public Health Service published the following description of hayfever weeds (July 21, 1916):[3] "The characteristic of hayfever weeds may be summarized as follows: (1) They are wind-pol-

Fig. 3.—Evening Primrose. It is listed in some of the older text-books as a hayfever plant, but it is harmless.

linated, (2) very numerous, (3) the flowers are inconspicuous, *without bright colors or scent.*"

Flowers that are fragrant or have bright colors are fertilized by insects, and their pollen is not in the air as in the case of the hayfever weeds, which are fertilized by the wind, and their pollen may

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[3]Hayfever and Its Prevention. Wm. Scheppegrell (U. S. Public Health Reports, July 21, 1916).

therefore reach the nostrils of hayfever subjects. This does not mean that the pollen itself of flowers may not be irritating to sensitive nostrils. In fact, the pollen of the golden rod, daisies, and many other flowers contain a substance which may produce a reaction in sensitive subjects. These pollens, however, *are not found in the air,* as in the case of hayfever weeds, so that the irritation can be caused only on direct contact with these flowers.

In the case of the golden rod, which generates more pollen than

Fig. 4.—Field Daisy. It is fertilized by bees and butterflies, and its pollen is never found in the air.

most insect-pollinated plants, a room may be infected by placing these around in large numbers. Under normal circumstances, however, the pollen of the golden rod or other bright flowers are never found in the atmosphere.

These facts have been substantiated by a special apparatus known as the "atmospheric-pollen plate,"[4] by means of which the various pollens found in the air may be detected and identified by the micro-

[4]Hayfever and Hayfever Pollens. Wm. Scheppegrell (Arch. Int. Med., June, 1917).

scope. The pollen is tested either by direct application to the nostrils of hayfever cases, or by injecting the extract of the pollen into the skin. The latter is a delicate test that is as reliable as the culture test in diphtheria.[5]

The following is a list of the harmless flowers that have been blamed for hayfever; also of the common weeds that are the principal causes of this disease.[6]

Fig. 5.—Dandelion. Its pollen is not atmospheric, but children should not apply the dandelion to the nostrils, as it may develop a latent hayfever.

HARMLESS FLOWERS.

Golden Rod (*Solidago,* Fig. 1). There are about 125 varieties of the golden rod, most of which are found in North America. They are cross-fertilized by butterflies and bees, and are typical insect-pollinated plants. As the pollen is not found in the air, they do not cause hayfever, except by direct application to the nostrils.

Rose (*Rosa,* Fig. 2). In addition to the numerous cultivated varieties, there are many wild species which are natives of North

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[5] The Treatment of Hayfever by Pollen Extracts and Bacterial Vaccines (New York Med. Record, June 1, 1918).

[6] Hayfever and Its Relation to 100 of the Most Common Plants, Trees, and Grasses. Wm. Scheppegrell (Med. Record, Aug. 11, 1917).

America.   These are among the most beautiful of our flowers, and many are highly fragrant.   In spite of the summer form of hayfever being called "rose cold," the pollens of the roses are never found in the air, and therefore do not cause hayfever.

Evening Primrose (*Oenothera,* Fig. 3).   These are among our most interesting wild flowers.   The large yellow lemon-scented flowers open just before sundown and fade in the sunlight of the

Fig. 6.—Resinweed.   Blamed in Wyoming and the adjoining states for the prevalence of hayfever, but its sticky pollen cannot rise in the air.

following day.   They are fertilized by the honey bee, bumble bee, and nocturnal moths.   They are listed as hayfever plants in some of the older text-books, but are harmless.   There are about 15 varieties in the United States and all are typical insect-pollinated flowers.

Field Daisy (*Chrysanthemum,* Fig. 4).   The botanical name of

the field daisy is "chrysanthemum," which is Greek of "golden flower." They are the most common flower of the field and road-side, and are universal favorites for their simplicity and decorative beauty.

There are about 100 varieties of wide geographical distribution. All are fertilized by bees and butterflies. Their pollen is never found in the air, so that they do not cause hayfever, although irritation may result in sensitive nostrils by direct contact with the flowers.

Fig. 7.—Common Ragweed. It is the cause of 90 percent of the fall hayfever east of the 100th meridian, and is the principal cause of hayfever in the United States generally.

Dandelion (*Leontodon,* Fig. 5). The familiar yellow flower of the dandelion is common both in the city and country. The broad-toothed jagged edge of the leaves bears some resemblance to the teeth of the lion, hence the name "dandelion" (dents de lion). There are about 20 varieties in North and South America. All are insect-pollinated and harmless, except on direct application. Children should not apply the dandelion to the nostril, as it may develop a latent hayfever, which may result in sensitization to atmospheric pollens.

Resinweed (*Grindelia squarrosa,* Fig. 6).   This is blamed in Wyoming and the adjoining states for the prevalence of hayfever. The pollen of the resinweed, however, like the flowers, is sticky and resin-like, as implied by the popular name (also called "gum

Fig. 8.—Giant Ragweed.   A typical hayfever weed, which replaces the common ragweed in moist localities from the gulf states to Quebec, and west to Manitoba, Nebraska, Colorado, and New Mexico.

plant" and "tarweed").   As the pollen is not wind-borne and therefore not in the air, it is not a cause of hayfever.   The probability, therefore, is that the resinweed, on account of its prevalence and conspicuousness, was selected in the same manner as the golden

rod, which has been so long held responsible for hayfever, while the real but insignificant hayfever weeds were unsuspected.

PRINCIPAL HAYFEVER WEEDS.

Common Ragweed (*Ambrosia elatior,* Fig. 7). This is the cause of 90 percent of the fall hayfever east of the 100th meridian, and is the principal cause of hayfever in the United States generally.

Fig. 9.—Sagebrush. This belongs to the **wormwood** family, which replaces the ragweed as the most common hayfever **wee**d in the Rocky Mountain and Pacific states.

The plant has all the characteristics of the hayfever weeds, being extremely common, with insignificant flowers (inflorescence) and without odor. The pollen is very irritating to hayfever nostrils, is generated in enormous quantities, and is so light that it will travel several miles through the air in a brisk wind (15 to 20 miles per hour).

Giant Ragweed (*Ambrosia trifida,* Fig. 8). This is also a typical

hayfever weed, which replaces the common ragweed in moist localities from the gulf states to Quebec and west to Manitoba, Nebraska, Colorado, and New Mexico.   It is called "horseweed," "bloodweed," and "wild hemp."   The plant bears no resemblance to the common ragweed, but the pollen, in its hayfever reaction[7] and under the microscope, is identical, except in size, which is about twice that

Fig. 10.—Goosefoot. It has a wide geographical distribution, but its hayfever reaction is much less marked than that of the ragweed or wormwoods.

of the common ragweed.   It is the principal hayfever weed in New Orleans and its vicinity.

Sagebrush (*Artemisia tridentata*, Fig. 9).   This belongs to the wormwood family (Artemisia), which replaces the ragweed as the most common hayfever weeds in the Rocky Mountain and Pacific states.[8]   While there are about 50 species found in these states,

[7]Classification of Hayfever Pollens from a Biological Standpoint. Wm. Scheppegrell (Boston Med. and Surg. Jour., July 12, 1917).
[8]Hayfever—Its Cause and Prevention in the Rocky Mountain and Pacific States. Wm. Scheppegrell (U. S. Public Health Reports, July 27, 1917).

there are a few species, such as the California mugwort and the sagebrush, which grow in great abundance in the neighborhood of towns and in agricultural districts, where they constitute a serious menace.

Although they are typical hayfever weeds, some of the varieties are used for decorative purposes, as, for instance, the Mexican mugwort (*Artemisia mexicana*).   After its use for this purpose

Fig. 11.—Russian Thistle.   Important cause of hayfever from New Jersey to Ontario, the Northwest Territory, Kansas, and Washington.

by a physician in the state of New York, he observed that large numbers of seedlings of these plants, which had been thrown out, were growing on his grounds, and inquired from us as to their effects in hayfever.   We at once notified him that the Mexican mugwort had a noxious pollen of far greater toxicity than the ragweeds, and brought the matter to the attention of the New York State Board of Health.   In the meanwhile we wrote to the dis-

tributors of the Mexican mugwort at New York, who promptly agreed to withdraw this plant from the market.

Goosefoot (*Chenopodiaceae*, Fig. 10). This family of plants, socalled on account of the shape of its leaves, has over 500 species, with a wide geographic distribution. Their hayfever reaction is much less marked than that of the ragweeds or wormwoods. Some of the species, however, are important causes of hayfever in certain sections, as, for instance, the Russian thistle (*Salsola*, Fig. 11), which is found in cultivated fields and waste places from New Jersey to Ontario, the Northwest Territory, Kansas, and Washington.
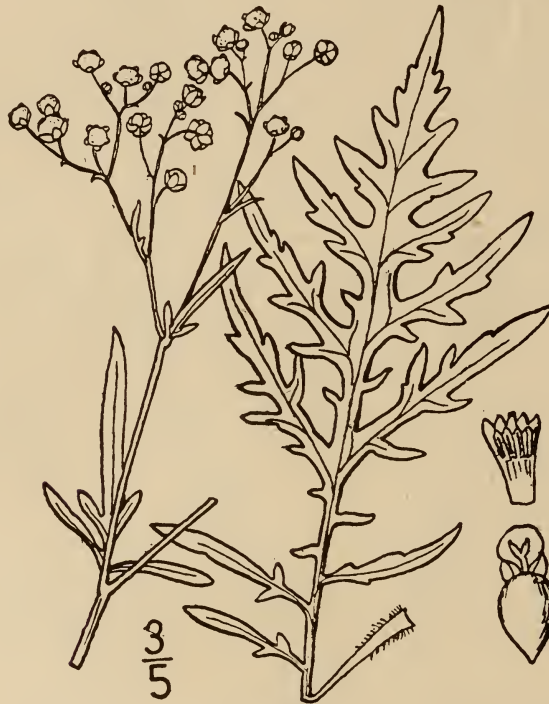
Fig. 12.—False Wormwood. It is responsible for a form of hayfever that is present practically all the year.

False Wormwood (*Parthenium hysterophorus*, Fig. 12). This is found from southern Pennsylvania to Illinois, Missouri, Florida, and Texas. Its leaves resemble those of the common ragweed, but the flowers are white tufts instead of yellowish tassels of the ragweed. The pollen of the false wormwood gives a hayfever reaction, but its pollen, though small, adhere together in bunches, so that they do not travel a distance greater than a city block. Their perennial bloom, however, is responsible for a form of hayfever that is present all the year.[9]

[9]Susceptibility to Hayfever, and Its Relation to Heredity, Age, and Seasons. Wm. Scheppegrell (U. S. Public Health Reports, July 19, 1918).

The Grasses (*Gramineae,* Fig. 13).   The pollen of the grasses is responsible for the early (spring-summer) form of hayfever. There are about 500 species of grasses, all of which give a hayfever

Fig. 13.—The Grasses.   All the grasses have wind-borne pollen, which is responsible for the early form of hayfever.

reaction, which is similar, although varying in degree.   As the ragweed families are not found in Europe, only the spring-summer hayfever is found in European countries.

FALSE NEUROMAS OCCURRING IN AMPUTATION STUMPS—REPORT OF A CASE.

By FRANK WARNER, M.D., Dr. Sc., F.A.C.S., Columbus, Ohio.

An enlargement occurring on the end of a severed nerve in an amputation stump is not of infrequent occurrence. These bulbous enlargements may be painful at times or they may be of slight consequence. They may be the occasion, however, of severe reflex pains. When once a false neuroma has occurred, it is quite likely to recur after removal, but not necessarily.

A true neuroma is one of the rarest of tumors; false neuromas frequently occur on the ends of severed nerves, or in injured nerves at the site of the injury. These neuromas are called false because they are made up largely of connective tissue derived from the neurellemma or from the sheath of Schwann. Microscopically the tumor appears to be made up of bundles of nerve fibers, but on closer inspection these fibrils are seen to be largely composed of connective tissue derived from the neurellemma, without any well-defined nerve tissue being present, but with the appearance of the nerve fibers preserved. Here and there the appearance of an illy developed axis cylinder is manifest, or a slight amount of medullary substance may be seen. The fibrils seem to grow in whorls; while some of them are cut horizontally, others are observed to have been cut longitudinally, as well as all possible positions between these. Between the abortive fibrils connective tissue is present in abundance.

These axone-like fibrils are evidently formed in the process of regeneration of the peripheral cut end of the nerve. The fibrils are growing and pushing downward in an attempt to join the lower or distal end of the severed nerve. While the tissue that is finally found at operation or autopsy composing these fibrils is largely connective tissue derived from the neurellemma, with a slight sprinkling of tissue suggesting axis cylinder or medullary substance, it is undoubtedly true that these fibers primarily have more of the elements of true nerve fibers soon after the process of regeneration has begun.

Ranson[1] has shown that within twenty-four hours after the sciatic nerve is severed the axis cylinder begins to push out from the periphery in the direction of the distal end of the nerve; if the distance is too great to span, then lateral offshoots are sent out from neighboring nerves.

[1] S. Walter Ranson (Journal of Comparative Neurology, 1912, XXII, p. 487).

The axones are always sent out from the central stump in the direction of the distal end, and it is from the central stump that regeneration finally takes place. Even if the distance between proximal and distal stumps are very considerable, Ranson has shown, by means of a new stain, that the new intervening connective tissue is no bar to the axone penetration of it. If the distance is very great, he found in his experiments that offshoots from lateral nerves penetrated the intervening connective tissue in an effort at bridging the two ends of the severed nerve with new axis cylinders. It has not been possible to demonstrate the method of this regeneration until the technic of Cajal, with his new stain, and quoted by
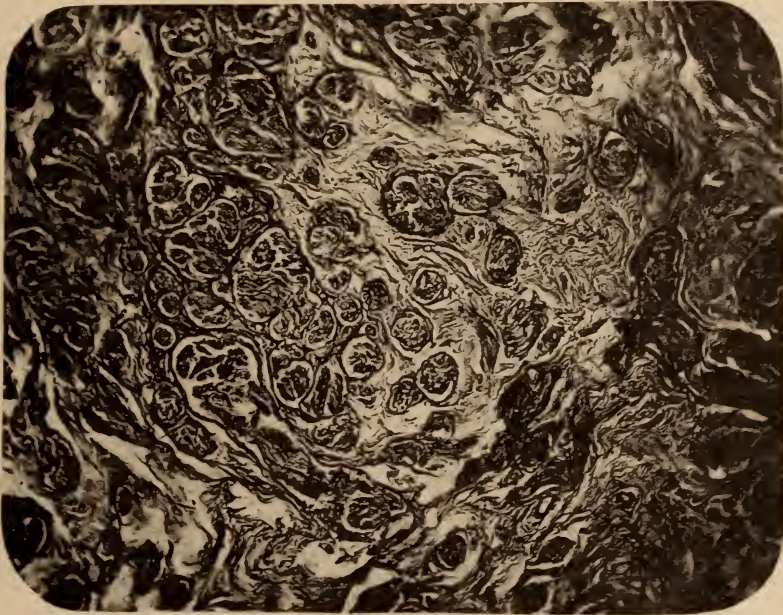
Section of the terminal enlarged end of the tibial nerve showing the abortive fibrils formed of connective tissue derived from the neurellemma in the process of incomplete regeneration of nerve tissue. The form of the fibrils is preserved during the process of abortive regeneration.

Ranson, was brought to the attention of neurological research workers.

Where the distal stump of the nerve is completely removed from the body, as in amputations, it is interesting to note what an effort nature makes in some cases to regenerate the central stump so as to reach the distal end of the severed nerve with new axones. The following case is of interest in this line: -

M. J. P., aged 63, had his left leg amputated in 1884 by reason of an accident. Twenty years later, in 1904, he was operated upon for the removal of a bulbar enlargement of the end of one of the nerves in the stump. Just how long this enlargement had been

present he does not know, but the stump had been painful for a long time, and reflex twitchings had been present along with the painful condition of the stump. The operation relieved the condition in part only.

In June, 1918, the patient consulted me on account of the painful condition of the stump and the general muscular twitching of the muscles in the stump, which was especially aggravated at night. This condition had existed for years, but had been especially increased during a few months preceding the time of the consultation. An examination revealed the presence of a well-defined tumor in the stump in the line of the tibial nerve. The mass was not especially sensitive to the touch, but deep and firm pressure produced pain. An operation for its removal was suggested and accepted. The tumor was 1½ inches long by ¾ inch in its lateral diameter. It was found to be a terminal enlargement of the severed tibial nerve.

The operation has been followed by a complete relief of the symptoms. Whether this absence of the symptoms is permanent remains to be seen. There is a tendency to the recurrence of these bulbous enlargements when once they have occurred and been removed. It is probable there is less likelihood of their original currence if the ends of the nerves are well removed, so that there is no tendency for them to become pinched in the abundance of connective tissue at the end of the stump. If this is done, it is certain that the cut end of the nerves, being well out of the way of the new connective tissue, they will escape a necessary pinching that the nerves are bound to undergo on the contraction of the connective tissue.

I am indebted to Dr. F. L. Landacre, head of the Department of Anatomy, and to Dr. Ernest Scott, head of the Department of Pathology, and his assistant, Miss Hazel Cameron, B.Sc., all of the Medical Department of the Ohio State University, for their courtesies shown me in making this limited research study of the false neuroma which is the subject of this paper.

CURRENT NOTES

Symptoms Which Precede General Arteriosclerosis.

In the Annual Oration of the Hunterian Society, 1918, as reported in *The Practitioner* for November, Dr. O. K. Williamson deals with the symptoms preceding and associated with general arteriosclerosis with high blood-pressure (hyperpietic form of Clifford Allbutt). After a discussion of the pathology, the sum of which is that the arteriosclerosis is the result of high blood-pressure, whatever may be the cause of the latter, the orator dealt with the symptoms of hyperpiesis, commencing with a description of the instrumental methods for estimating blood-pressure, with a warning against too great a reliance on even the most erudite finger and against conclusions based on single or few pressure observations. The symptoms are taken up under systematic heads, preceded by a general account of the earliest group.

SYMPTOMS OF HYPERPIESIS.

There may be a heaviness or oppressive fullness in the head, or an actual headache. This headache may be pulsatile in character. Drowsiness, insomnia, fatigue—especially in the morning—sometimes occur, or inaptitude for work and inability to concentrate the attention; this inaptitude, perhaps, alternating with a mild psychic exaltation, cerebral confusion, despondency, giddiness (especially in the morning), failure of memory, noises in the ears, migrainous or neuralgic attacks, nervousness.

Huchard gives the following symptoms: Local areas of coldness, coldness which may be limited to the lower limbs, to a segment of the limb, to the knees, sometimes to the upper extremities, more rarely to half the body.

Again, there may be local syncope of the extremities, "rheumatic" pains and cramps in the limbs, with a sensation of local fatigue or of weight, vague pains, paroxysmal pallor of the integuments (especially of the face). A tendency to hemorrhage may be evident, thus hemoptysis or epistaxis may occur, and this epistaxis may be the first symptom; there may be a tendency to dyspnea, especially on exertion, to intermittent polyuria. Some of the cases of hemoptysis have manifestations of rheumatism or fibrous rheumatism. The dyspnea is accompanied at times by a sensation of vague pain in the chest and anxiety, sometimes nocturnal, in occurrence. There may be palpitation, often accompanied with a vague sensation of precordial fullness.

SYMPTOMS ASSOCIATED WITH EARLY ARTERIOSCLEROSIS.

Although we cannot hope to effect a *restitutio ad integrum* of the damaged arteries, yet by diagnosis and judicious treatment much may be done to prevent the development of the condition, or, if it be more or less localized, to prevent its involving other parts of the arterial system.

The general nutrition is usually good; there is often a tendency to fatness, though some patients are thin. Allbutt says that the countenance is healthy or too florid, or there may be a sallowish ground tint with a splash of ruddiness upon the malar eminences.

In addition to the qualities of the pulse already detailed, it may be pointed out that the pulse may show an extra systole now and then (Mackenzie) or

more frequently. There may be paroxysmal tachycardia; Mackenzie finds that the extra systoles are usually of ventricular origin. The extra systoles may occur at every second beat, in which case the condition must be distinguished from pulsus alternans. The diagnosis between these conditions can be made by reducing the arterial pressure by nitrite, when in high pressure cases the pulse becomes regular. Under high pressure, while before disease has occurred, fatigue of contractivity sets in, true pulsus alternans may appear; under high pressure also there may be a string of premature rhythms of the pulse; and, on reduction of the pressure to normal, regular rhythm may return. There may be shortness of breath or a sense of substernal constriction; the patient, too, may be sensible of the heart's action at night, especially when lying upon the left side, or there may be an uneasy aching about the heart. The heart usually shows the signs of hypertrophy, the apex beat being displaced downward and outward, and the impulse forcible and heaving in character. The first sound is prolonged. There may be a *bruit de galop*. The second aortic sound is accentuated. On the other hand, the hypertrophy may have given way to dilatation. The subcutaneous veins may then be swollen, there is slight edema of the shins, crepitations or harsh and prolonged breathing at the pulmonary bases, where the percussion note is a little muffled. Symptoms of angina pectoris may occur.

As Mott points out, the nervous system, or parts of it, may suffer from partial or complete ischemia, and the symptoms are due to circulatory disturbances.

The patient, if naturally energetic, is found to have of late lost his elasticity, to have become more sluggish, fretful, and despondent, especially early in the day, cheering up toward evening; not only so, but there may be exhaustion following mental or physical exertion. Disturbances of sleep are common. Torpor is a common symptom. Irritability of temper may occur. The high blood-pressure may produce a sense of energy, or even an increased activity. Grave obsession may occur. There may be attacks of maniacal excitement or depression.

Vertigo is common, especially occurring on change from the recumbent to the erect position. It may be of any degree from a slight consciousness of instability to the Ménière syndrome fully developed. Localized arterial spasm is the explanation of a group of symptoms, including formication, intermittent claudication, temporary scotoma, and apoplectic seizures, simulating cerebral hemorrhage.

Osler classes this last group as follows: (a) Healthy individuals with high blood-pressure, but without signs of arterial disease. (b) Patients with well-marked arteriosclerosis, in whom the cerebral attacks have come on without warning, sometimes as the signal symptom. A majority of my cases come in this group. (c) In advanced sclerosis with cerebral changes, manifested by progressive mental and muscular weakness, all possible types of these transient seizures, including convulsions, may occur. The attacks are most frequent in the aged, but men in the fifth and sixth decades are also affected.

He mentions the following points in symptomatology: "The symptoms are extraordinarily varied, but tend in individual cases to repeat themselves in the attacks. Sensory disturbances rarely occur alone; motor paralysis is the most common symptom, and may be hemiplegia, or only the face and hand or arm may be involved. The paralysis, rarely complete, has a transient character, which, with the recurrences, give it a peculiar stamp. Complete recovery is, of course, seen in monoplegias and hemiplegias of organic origin, but not in a few hours or in a day. Loss of consciousness is not common in my experience. The diagnosis is based on the existing conditions of high tension or sclerosis, or both, the slight and transient character of the attacks, and the recurrences."

To this last Williamson adds a fourth class of cerebral seizures, especially migrainous cases, without signs of arterial disease or high blood-pressure. (The writer is intimately acquainted with a case of migraine with scotoma aura, with low blood-pressure.)

Arterial spasm of the spinal cord vessels results in symptoms distinguishable from intermittent claudication of the lower limbs only by the persistence in the former case of the limb circulation.

The respiratory symptoms may be bronchial cough, with expectoration. Paroxysmal dyspnea is occasionally met with, and is particularly to be feared because it leads to fulminating pulmonary edema. Latent high pressure may be revealed by dyspnea occurring at high levels.

The digestive symptoms are too varied to abstract.

Influenzo-Pneumococcal and Influenzo-Streptococcal Septicemia.

Abrahams, Hallows, and French published a paper on "Purulent Bronchitis, Its Influenzal and Pneumococcal Bacteriology," in conjunction with Dr. John Eyre, in *The Lancet* of September 8, 1917, drawing attention to the anomalous character of many of the cases of "pneumonia" that were encountered in the Aldershot Command during the years 1915, 1916, and 1917. They felt that "pneumonia," in the sense of true croupous lobar pneumonia, was a misnomer in connection with many of them. The "purulent bronchitis" type of certain of these anomalous cases that had up to that time been returned generally as "pneumonia" is now familiar to most army physicians, but at the time of these investigations, and those of Hammond, Rolland and Shore, the bacteriological nature of this severe purulent bronchitis, with its remarkable heliotrope cyanosis, abundant sputum, and high mortality, was not recognized generally.

Though it was occurring in the form of multiple small epidemics in France and in England, there was then no generalized epidemic to lead to the suspicion that it had an influenzal basis; and it was as the result of extended bacteriological research, intravitam and postmortem, and not from the observation of clinical phenomena, that its causation was found to be primarily influenzal, with symbiotic or secondary invasion of the respiratory tract and circulating blood by either pneumococci or streptococci, the virulence of which, it seemed, had been so exalted by the coexistence of influenza bacilli that they caused death in a high percentage of cases by reason of a veritable pneumococcal or streptococcal septicemia.

The condition, though labeled "purulent bronchitis" on account of the dominating characteristics—viz., the severity of the chest symptoms, and particularly the appearance and quantity of the sputum—seemed to us, even at that time, to be an "influenzo-pneumococcal" or an "influenzo-streptococcal" septicemia, with a prominence of lung symptoms rather than a purely pulmonary disease. The question of the relationship of the streptococci to the pneumococcal cases is elaborated later in this paper, but it may at once be stated that there is now much evidence in favor of the view that the streptococcal organisms described in certain epidemics may be really pneumococci growing temporarily in streptococcal form.

In *The Lancet* of January 4, 1919, the same authors publish a long and exhaustive article on this subject, on which the following are the conclusions:

1. The recent pandemic of influenza has included a large number of cases of septicemia or toxemia, with a high degree of mortality.

2. These severe cases appear definitely related to the cases of "purulent bronchitis" which have been described as occurring in various parts of the country and in France. The essential feature is an infection by the *Bacillus*

influenzæ, with a secondary infection by some other organism. The existence of copious purulent expectoration is only an incident, which may or may not be present and which has been singularly absent in the recent pandemic.

3. The secondary organism in question is the pneumococcus, *Streptococcus pyogenes longus*, or a "diplostreptococcus," the virulence of which appears to be exalted by the initial influenzal infection.

4. The characteristic features of the septicemic type of case are variable lung symptoms, ranging from slght bronchitis to lobar pneumonia, very characteristic heliotrope lividity, dyspnea, or rather polypnea, and very rarely orthopnea. These, with other socalled complications of influenza, such as pleurisy, nephritis, and others of lesser import, are evidence of the septicemia or toxemia referred to.

5. The relative frequency of the septicemic type of case cannot be estimated with any degree of accuracy. The mortality of the septicemic cases would appear to be as high as 90 percent at the beginning of an epidemic, falling to 50 percent at its termination.

6. Infection takes place in the upper respiratory passages, and involves the accessory nasal sinuses, where a septic sinusitis develops. From this and possibly other foci as yet undetermined the toxemia or septicemia originates.

7. In view of the large number of instances in which the diplostreptococcus has been isolated in pure culture from the heart's blood and internal organs immediately after death, it is concluded that this organism plays an important role in the fatal cases.

9. The very large majority of cases of influenza run an uncomplicated course, terminating in from three to fourteen days. No treatment has been found to be of any value in aborting an attack, or in preventing its development into the virulent type.

9. The large majority of cases of septicemic type die in spite of any form of treatment. Cases have recovered who have been given no specific treatment of any kind.

A Fellowship of Medicine.

At the beginning of last month Sir Arbuthnot Lane presided over a meeting held at the house of the Royal Society of Medicine to consider the desirability of forming an association for cooperation in medicine among the English-speaking countries. It was understood that the national limitations thus indicated would not be insisted on, though for the time being the promotion of mutual understanding between the medical profession in the United States and the British Empire was the main objective of the movement. The meeting at the Royal Society of Medicine grew out of an earlier and informal gathering held at the invitation of Lord Eustace Percy, at which it was urged that the opportunity presented by the coming together of medical men from America and all parts of the British Dominions should be utilized to organize some permanent form of organization. At that meeting the obvious arguments for the advancement of some plan mutually beneficial to the medical profession of both nations were ably stated by the host and convener, and by others present, and as a result Sir St. Clair Thomson and Mr. J. Y. W. MacAlister were asked to act as honorary secretaries and requested to formulate a scheme. These two well-chosen representatives of science and organization having consented to do their best, at the meeting at the house of the Royal Society of Medicine a short report was submitted by them on December 4, and from this report it appears that the Royal Society of Medicine has generously agreed to let the new organization have office room in the house of the Society, so that 1 Wimpole street may now be regarded as the official headquarters of the movement.

The Royal Society of Medicine has now issued a cordial invitation to the medical men of the Dominions and America, as well as to the medical men of all the Allies, to use the buildings of the Society as the home of a Fellowship of Medicine, which henceforth has a local habitation with a tentative name, "The Inter-Allied Fellowship of Medicine." Further support of the movement has been reported on the part of the director-general of the Army Medical Service, Surgeon-General Goodwin, who has arranged that in all the commands the medical officers from overseas should be cordially invited to attend clinics, lectures, and demonstrations, and be given every facility for imparting as well as obtaining information. As regards London, the principal hospitals have been invited to extend the teaching of their institutions to overseas medical officers, and a general invitation has been accordingly given to our medical colleagues to come to the hospitals at stated hours and to attend lectures or operations. We wish we could add that the London hosptials were with one accord ready to welcome American medical men, medical men from the Dominions, and representatives of our science from among all our Allies to a properly arranged course of post-graduate instruction. As yet no such organization exists, and the pity of this is now terribly apparent. Here, in London, we have unexampled opportunities. Our pathological material is unrivaled. The local center of the medicine of 6,000,000 people, London is the metropolis of an empire beneath whose sway—no statement to be proud of— every disease in nosological nomenclature occurs daily, and the meeting place of the doctors of civilization and of the tropical disorders of the world. No center offers such clinical opportunities to the post-graduate student, and no city has taken less trouble to display its wealth for the benefit of those who, by obtaining a share of it, might disseminate what they thus obtained to the incalculable advantage of the world. The Fellowship of Medicine was founded because the congregation, in circumstances of war, of medical men from all parts of the United States and of our Dominions called for some practical outcome of the reunion. The most practical issue conceivable would be that those who joined the Fellowship would find themselves post-graduate students of the Metropolitan Medical Schools, and we trust that this is what may occur. This is said with no ignorance of the severe task of organization that lies before those who would put any scheme of the sort into being. There is a great deal of spade work to be done before the London hospitals can provide some symmetrical yet flexible post-graduate scheme from which we and our Allies could derive real profit. But before the war Berlin and Vienna could give solid reasons why the post-graduate students from other countries should resort to their clinics. Berlin and Vienna will issue no invitations in the immediate future, and, if they did, the invitations would be declined. The opportunity of New York and London is unparalleled. Speaking only for London, why should it not be taken? Dr. Hale White has asked the same question in a pertinent manner.

To return to the doings of the Fellowship, the report, presented by Mr. MacAlister, was supported by Sir St. Clair Thomson, who, in recommending its adoption, urged the desirability of establishing individual cooperation. He said that if volunteers would offer to take personally conducted parties to visit institutions, a permanent *entente* would be created. This is true, but a series of disconnected and desultory visits to London hospitals will count for nothing that is permanent in pathology, however deep the memory of the casual hospitality may be. At the end of the meeting at the Royal Society of Medicine a general committee was nominated, Sir Arbuthnot Lane being appointed honorary treasurer and Sir St. Clair Thomson, Mr. Douglas Harmer, and Mr. J. Y. MacAlister honorary secretaries. To the officers of the new movement we would point out earnestly that one objective of the Fellowship

is clear. It is the institution of a real post-graduate medical school in London, but the preparatory labor will not be light. Moreover, it will have to be undertaken with full knowledge of existing designs in the same direction. It will be necessary that the Fellowship should come into *rapport* with Sir William Osler and others, so that previous thought and accomplishment may not be wasted, and overlapping may be avoided.—The Lancet, Jan. 6, 1919.

Glucose in the Spinal Fluid in Acute Meningitis.

Pignot, in Paris médical of December 28, 1918, returns to the subject of the occurrence of glucose in certain meningitic conditions in the spinal fluid, supplementing his previous papers with Terrasse and Laroche, on the same subject, with a description of qualitative and quantitative method for the analysis. Previous observations had led to the following conclusions:

Disappearance and reappearance, alternatively, of the glucose in cases of nontuberculous acute meningitis tending toward a cure.

Disappearance of glucose in relapses and its reappearance at the termination of its critical phase.

Steadiness of the glucose factor during serum sickness. (An important aid in establishing differential diagnosis between this condition and a relapse.)

Absence of change in the glucose factor in meningismus in which the spinal fluid is aseptic and otherwise normal.

In view of the minute quantity of glucose to be detected and estimated, and of the numerous substances present which may interfere negatively or positively with a satisfactory result, Pignot has examined the various analytical methods available and has chosen the two following:

1. *For the Removal of Interfering Substances.*—To 5 c.c. of the spinal fluid is added a pinch of a mixture in equal parts of the acetates of lead and of zinc; the mixture is now heated to the boiling point in water bath and centrifuged. The clear liquid is decanted and is examined for glucose in the ordinary way with Fehling's solution. The excess of alkali in the Fehling's dissolves the oxide of lead and zinc.

2. *Quantitative Procedure.*—To 2 c.c. of the clarified spinal fluid are added 5 c.c. of fresh Fehling's solution; heat for seven or eight minutes in the boiling water bath and centrifuge; decant and drain off the supernatant fluid. To the deposit add 5 c.c. of a 10-percent acid solution of ammonium molybdate.

The resulting blue solution is compared in any suitable colorimeter against a standard.

BOOK REVIEWS.

Johnson's Standard First Aid Manual. Suggestions for Prompt Aid to the Injured in Accidents and Emergencies. Edited by Fred B. Kilmer, Lecturer in First Aid; Member of St. John's Ambulance Association, the International Congress of First Aid and Life Saving, the American Public Health Association, The Royal Society of Arts, etc. In collaboration with eminent surgeons, first aid authorities, and specialists. Illustrated. Eighth edition, revised. New Brunswick, N. J.: Johnson & Johnson. Cloth, 50 cents.

Whether for systematic study or for immediate reference in an emergency, we know of no book more to be commended than this.

Principles of Bacteriology. By Arthur A. Eisenberg, A.B., M.D., Director of Laboratories, St. Vincent's Charity Hospital; Demonstrator of Pathology, School of Medicine, Western Reserve University; Visiting Pathologist, St. John's Hospital; Visiting Pathologist, Lutheran Hospital; Fellow American Medical Association. Illustrated. St. Louis: C. V. Mosby Company, 1918, $1.75.

This work seems to be intended for nurses—that is, for persons who desire little more than a looker-on's intelligent comprehension of the principles, the language, and the more elementary facts of bacteriology. For this purpose the book is well adapted.

Cancer. Its Nature, Causes, Diagnosis, and Treatment. By Robert Holmes Greene, A.M., M.D., F.A.C.S., Emeritus Professor of Surgery, Medical Department of Fordham University, etc. New York: James T. Dougherty, 1918.

In its thorough presentation of the causes, nature, and diagnosis of cancer this little volume offers hardly any entirely new information, though in the discussion of the treatment much emphasis is placed on the use of the rarer metals, like vanadium, selenium, and tellurium. This particular feature of the volume, embodying the personal experience and investigations of its author, a surgeon, and of an expert physiologic chemist, John A. Killian, deserves consideration and unbiased study on a larger clinical material.

A Handbook of Colloid Chemistry. The recognition of colloids, the theory of colloids, and their general physico-chemical properties. By Dr. Wolfgang Ostwald, Privatdozent in the University of Leipzig. Second English edition, translated from the third German edition by Dr. Martin H. Fischer, Professor of Physiology in the University of Cincinnati. With numerous notes added by Emil Hatschek, Cass Institute, London. 284 pages, with 63 illustrations. Philadelphia: P. Blakiston's Son & Co., 1919, $3.50.

No one can have an intelligent grasp of modern biochemistry without a sound, if elementary, knowledge of colloid chemistry and physical chemistry. On the former subject there is no separate text which can rival Ostwald's handbook as an elementary exposition.

Physical Diagnosis. By W. D. Rose, M.D., Lecturer on Physical Diagnosis and Associate Professor of Medicine in the Medical Department of the University of Arkansas. With 294 illustrations. St. Louis: C. V. Mosby Company, 1917, $4.

The best feature of Rose's book is the illustrations. They are numerous and

good, though mostly taken, with due acknowledgment, from other works. The text itself cannot be praised without reserve. It is neither accurate regarding the theoretic portion nor lucid as regards its practical interpretation. It is hard to forgive a writer who says: "In outlining lesions near the surface of the chest, superficial percussion is employed, the stroke being light. In outlining deep lesions, deep percussion, with heavy strokes, must be employed." The last statement is in direct conflict with the best modern technic.

PHYSIOLOGY AND BIOCHEMISTRY IN MODERN MEDICINE. By J. J. R. MacLeod, M.B., Professor of Physiology in the University of Toronto, Toronto, Canada; formerly Professor of Physiology in the Western Reserve University, Cleveland, Ohio. Assisted by Roy G. Pearce, B.A., M.D., Director of the Cardiorespiratory Laboratory of Lakeside Hospital, Cleveland, Ohio, and by others. With 233 illustrations, including 11 plates in colors. St. Louis: C. V. Mosby Company, 1918, $7.50.

The name of the senior author is almost sufficient to keep the reviewer from reading this work if it were not a pleasure to do so. This is a most valuable contribution to our literature of the No Man's Land between the ancillary sciences and the art of medicine. The work is uneven, particularly on the biochemical side. This arises probably from the difficulty of knowing what to omit in order to keep the volume within reasonable dimensions.

TEXTBOOK OF CHEMISTRY. Inorganic and Organic, with Toxicology. For students of medicine, pharmacy, dentistry, and biology. By R. A. Witthaus, A.M., M.D., late Professor of Chemistry, Physics, and Toxicology in Cornell University. Seventh revised edition by R. J. E. Scott, M.A., B.C.L., M.D., Fellow of the New York Academy of Medicine, editor of "Witthaus' Essentials of Chemistry and Toxicology," etc. Illustrated. New York: William Wood & Co., 1919, $4.

As this is the seventh edition of this work, it scarcely requires review. It is difficult to believe that a course in chemistry for which this book would serve as a text could possibly be a rational one for "students of medicine, pharmacy, dentistry and biology," to quote the subtitle. The work seems to fall between two stools—the attempt to be a textbook for the inculcation of principles and a too compendious packing of facts.

A TEXT-BOOK OF OBSTETRICS. By Barton Cooke Hirst, A.B., M.D., LL.D., F.A.C.S., Professor of Obstetrics in the University of Pennsylvania; Gynecologist to the Howard, the Orthopedic, and the Philadelphia General Hospitals. Eighth edition, revised and reset, with 715 illustrations, 38 of them in colors. Philadelphia and London: W. B. Saunders Company, 1918, $5.

In regular succession new editions of this standard text-book on obstetrics follow each other, thus offering to its author the ever welcome opportunity to keep his work steadily abreast with the very latest developments in this field of practical medicine. A widely used text-book in its eighth edition does not call for a detailed description of its scope or of its special commendable features. It might suffice to state that the author has renewed his efforts to condense the text, to omit unessentials, and to add all the new teaching that has proved of permanent value.

CHEMICAL PATHOLOGY. Being a Discussion of General Pathology from the Standpoint of the Chemical Processes Involved. By H. Gideon Wells, Ph.D., M.D., Professor of Pathology in the University of Chicago and in Rush Medical College, Chicago; Director of the Otho S. A. Sprague Memorial Institute. Third edition, revised and reset. Philadelphia and London: W. B. Saunders Company, 1918, $4.25.

Wells's Chemical Pathology appeared first in 1907, was revised in 1914, and

now appears in its third edition. It is a vast storehouse of information about the chemical aspects of pathologic processes, ranging from the venoms and ptomains to gout and diabetes. Even so, it is not complete. Thus, in the chapter on diabetes, one looks in vain for a discussion of carbon dioxide pressure in the blood, but in so enormous a field completeness was hardly to be looked for outside of a German text-book. All laboratory technic is intentionally omitted.

CLINICAL DISORDERS OF THE HEART BEAT. A Handbook for Practitioners and Students. By Thomas Lewis, M.D., F.R.S., D.Sc., F.R.C.P., Physician of the Staff of the Medical Research Committee, etc. Fourth edition. New York: Paul Hoeber, 1918.

Since our notions of cardiac disease have been revolutionized by the development of the graphic methods, it has been difficult for the general practitioner to keep abreast with modern ideas on the subject. The current text-books are either sadly out of date or so bulky and technical as to daunt all but the specialist. Hence it is not strange that so lucid and concise an account of the arhythmias as that furnished by Lewis should soon have reached its fourth edition. In spite of the fact that most of Lewis' work has been electrocardiographic, the illustrations are all polygraphic, as furnishing a clearer picture to the general medical reader. The book can be unreservedly recommended to anyone who wishes to obtain a preliminary acquaintance with modern notions concerning subnormalities of pulse.

THE ROENTGEN DIAGNOSIS OF DISEASES OF THE ALIMENTARY CANAL. By Russell D. Carman, M.D., Head of Section on Roentgenology, Division of Medicine, Mayo Clinic; Professor of Roentgenology (Mayo Foundation), Graduate School of Medicine, University of Minnesota, and Albert Miller, M.D., First Assistant in Section on Roentgenology, Division of Medicine, Mayo Clinic; Fellow in Roentgenology (Mayo Foundation), Graduate School of Medicine, University of Minnesota. With 504 original illustrations. Philadelphia: W. B. Saunders Company, 1917, $6.

The growing importance of roentgenology in the diagnosis of diseases of the digestive tract makes a compact collection of the essential facts most welcome. Based on the enormous material available at the Mayo Clinic, Carman and Miller's book represents not only an adequate presentation of the present status of the subject, but much new and original material. The illustrations, with which the volume is profusely equipped, are clear and add greatly to its value. It is quite indispensable as a book of reference to any clinician who does x-ray work.

SCOPOLAMINE-MORPHINE—Semi-Narcosis During Labor. By Wm. Osborne Greenwood, M.D. (Leeds), B.S. (London). New York: Oxford University Press, 1918, $2.

This small volume fulfills two purposes—it gives a rather complete review of the extensive literature on scopolamine-morphine narcosis, better known in this country as "twilight sleep," and contains an exact record of the method as employed by the author for more than two and a half years.

Very correctly the writer states in the preface that among those who have discountenanced the method there are the names of many eminent obstetricians, but that still there are prominent leaders who have given it unstinted praise. Those willing to apply this method in their obstetric work will find in this new book an excellent expose of the procedure in its every detail. Perusal of the work leaves no doubt that it is written by a man who, though well pleased with twilight sleep, is unwilling to enter into any serious polemic with its antagonists, but, on the other hand, carefully avoids to exaggerate unduly its advantages.

PRACTICAL PHYSIOLOGICAL CHEMISTRY. A Book Designed for Use in Courses
in Practical Physiological Chemistry in Schools of Medicine and of Science.
By Philip B. Hawk, M.S., Ph.D., Professor of Physiological Chemistry
and Toxicology in the Jefferson Medical College of Philadelphia. Sixth
edition, revised and enlarged. With 2 full-page plates of absorption spectra
in colors, 4 additional full-page color plates, and 185 figures, of which 12
are in colors. Philadelphia: $3.50.

This work has become the indispensable *vade mecum* of the physiologic and
pathologic chemist, though it started out as a student's text-book of laboratory
work. Of its origin it retains traces in an occasional direction for exercises,
which occur surprisingly in a few places. Little remains for a reviewer except
to welcome each new edition and to note the changes. There is now a chapter
devoted to acidosis, in which that perplexing subject is adequately treated.
On page 322, lines 3 and 5 from the foot, "hydrocyl" is twice printed in error
for "hydrogen." In the same passage the expression N/10 acid and N/10
alkali are used without specifying what acid and what alkali are intended,
a usage tending to produce confusion in the minds of those who have not
mastered the difference between titrable acidity (or alkalinity) and hydrogen
ion concentration.

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THE ELEMENTS OF THE SCIENCE OF NUTRITION. By Graham Lusk, Ph.D., Sc.D.,
F.R.S. (Edinburgh), Professor of Physiology at the Cornell University
Medical College, New York City. Third edition, reset. Philadelphia and
London: W. B. Saunders Company, 1917, $4.50.

In the preparation of the first edition of this book a decade ago the endeavor
was made to admit to the introductory chapter only such material as appeared
to be susceptible of scientific proof and to make it the key to the rest of the
book. In this, the third, edition that chapter remains virtually unchanged. The
rest of the book shows many important additions to the facts of metabolism
and revisions of its theories. The aim of the book remains the same—to review
the scientific substratum on which rests present-day knowledge of nutrition,
both in health and in disease. Throughout no statement has been made with-
out endeavoring to examine the evidence on which it is based.

After a careful description of the Atwater-Rosa calorimeter, the utilization
of the various food elements is discussed in successive chapters—first in health,
then in disease. A chapter on food economics, and a most useful and compre-
hensive table of the nutritive and economic value of all the usual food products,
close a volume that will long remain indispensable to all students of dietetics.

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HYGIENE OF THE EYE. By Wm. Campbell Posey, A.B., M.D., Ophthalmic Sur-
geon to the Wills and Howard Hospitals; Professor of Diseases of the Eye
in the Philadelphia Polyclinic; Ophthalmologist to the Department of
Physical Education of the University of Pennsylvania; Chairman of the
Commission on Conservation of Vision of Pennsylvania. With 120 illus-
trations. Philadelphia and London: J. B. Lippincott Company, 1918, $4.

Dr. Posey has produced a thoroughly readable and comprehensive treatise
which will interest the ever-widening group of people, social workers as well
as ophthalmologists, who are interested in the conservation of vision and the
prevention of blindness. By way of introduction to the principal subjects,
several chapters are devoted to the anatomy and physiology of the eye, its
internal and external diseases, errors of refraction, and the effect of eyestrain
on the general health. Full consideration is given to ocular accidents in industry
and the means of prevention. One chapter is devoted to the ocular hygiene
of the school room, which, of course, has an important relation to conservation
of vision. Four of the chapters have been written by distinguished specialists
in the subjects discussed. The illustrations, we regret to say, are rather more
ancient than illuminating.

GYNECOLOGY. By William P. Graves, A.B., M.D., F.A.C.S., Professor of Gyne-
cology at Harvard Medical School; Surgeon-in-Chief to the Free Hospital
for Women, Brookline; Consulting Physician to the Boston Lying-In Hos-
pital. With 363 half-tone and pen drawings by the author and 123
microscopic drawings by Margaret Concree and Ruth Huestis, with 100 of
the illustrations in colors. Second edition, thoroughly revised. Philadel-
phia and London: W. B. Saunders Company, 1918, $7.75.

At the time of the appearance of the first edition of this work its scope and
its many characteristic features were described in detail. At that time it
seemed obvious that a text on gynecology presenting the subject in an entirely
new manner and in such a strikingly attractive form could not fail to arouse
the general interest of the profession. This prophecy has proved correct.
With the quick exhaustion of the first edition the author was given the oppor-
tunity to correct minor defects, to add much new material, and to improve
illustrations wherever it seemed desirable. This second, thoroughly revised
edition reflects the very latest work in the field of the internal secretions,
records the most recent experience in radium therapy, and includes the dis-
cussion of the relation of Freud's sex theories to gynecology.

DISEASES OF THE HEART AND BLOOD VESSELS. By Thomas E. Satterthwaite,
A.B., M.D., LL.D., Sc.D., Consulting Physician to the Post-Graduate, Or-
thopedic, Manhattan State, and Babies' Hospitals; Fellow of the American
College of Physicians, etc. New York: Lemcke and Buechner, 1918.

It has been the author's purpose to provide a "useful guide for the practi-
tioner." This purpose he accomplishes by first reviewing succinctly the general
and special methods of diagnosis. Among the latter the chapter on blood
pressure is especially instructive. He then takes up in detail the common and
unusual forms of cardiac lesions. The volume also contains articles on the
relation between internal secretion and the heart and on surgery of the heart.
On the whole, it is a thoroughly modern treatise, and as such of value as a
review and a compendium of the diseases of the heart. In the chapter on
drug therapy the author includes camphor under the cardiac stimulants, stat-
ing that it can be very effective in cases of cardiac insufficiency. Experiences
during the recent epidemic and in other cases of pneumonias would seem to
bear out this statement. In view of the very conflicting opinions as to the
effectiveness of camphor, a thorough investigation and compilations of the
results seems indicated.

A SURGEON IN ARMS. By Captain R. J. Manion, M.C., of the Canadian Army
Medical Corps. New York and London: D. Appleton & Co., 1918, $1.50.

Somewhere in this volume the author somewhat sympathetically speaks of
those "who are so unfortunate as to have to remain hundreds, or perhaps
thousands, of miles from the center of interest in the greatest game the world
has ever known." These "unfortunates" should feel under everlasting obliga-
tion to him for bringing them as close as possible at such a prodigious distance
to this game "played by all the highly cultured, civilized, and refined peoples
of the world." This war has created some remarkable examples of descriptive
literature, but only a few that might be considered better than this vivid and
realistic tale of a Canadian physician who has won the military cross for
conspicuous bravery. Following this keen observer through the trenches,
dodging shells, dressing patients under fire or in gas-filled dugouts, occasionally
leading a life of comparative ease in a larger hospital, continually observing
all that is going on around him, always reflecting and philosophizing with a
rich sense of humor, indeed brings one quite close to the actualities of this
war, to its horror and its occasional humor. The reader who, misled by the
title of this fascinating book, expects much or only medical talk, will be pleas-

antly disappointed; it is another description of war life, this time from the vewpoint of the medical man in the front line.

PRINCIPALS AND PRACTICE OF INFANT FEEDING. By Julius H. Hess, M.D., Major M.R.C., U. S. Army, Active Service, Professor and Head of the Department of Pediatrics, University of Illinois College of Medicine; Chief of Pediatric Staff, Cook County Hospital; Attending Pediatrician to Cook County, Michael Reese, and Englewood Hospitals, Chicago. Illustrated. Philadelphia: F. A. Davis Company, 1918, $2.

In his attempt to offer his subject within the limits of a small-sized volume, the author has adopted a rather original and ingenious scheme of presentation. In part I he outlines the anatomy and physiology of the digestive tract, the principles of milk digestion, and concludes with the bacteriology of the intestinal canal of the infant. Part II is devoted to the problem of breast feeding, containing numerous most practical suggestions to the nursing mother. Parts III and IV present the question of artificial feeding and the nutritional disturbances unfortunately following so often in its wake. An appendix of over 50 pages gives in form of succinct statements a wealth of definite information concerning proprietary preparations, preparation of food for infants, weights, measurements, stool, urine, proper hygiene, general care of infants, and many other important questions in the problem of infant care. While primarily designed for the needs of the students, this little book undoubtedly can be advantageously used by the instructor of nurses, and probably might prove valuable even in the hands of the intelligent mother.

EMERGENCIES OF A GENERAL PRACTICE. By Nathan Clark Morse, A.B., M.D., F.A.C.S., Surgeon to Emergency Hospital, Eldora, Iowa; District Surgeon Chicago Northwestern Railway, Minneapolis & St. Louis Railway; Ex-President Iowa State Association of Railway Surgeons; Ex-Vice-President Pan-American Congress; Fellow American Medical Association; Member of the Society of Clinical Surgeons of North America; Author of "Post-Operative Treatment." The book has 500 pages, with 251 illustrations. St. Louis: C. V. Mosby Company, 1918, $4.50.

The scope of this book is expressed in the title. The author has attempted to record some of the observations and practical experiences of a somewhat active service of forty years in emergency practice, the class of work where the attending physician is called on to think quickly and to act with rapidity and good judgment. Reference is also made to certain pathologic conditions, appendicitis, tubal rupture, acute pancreatitis, etc.—emergency cases, though distinctly surgical.

The object of the author is to consider the common, unheralded, every-day accidents or emergencies that may and do arise to confront the general practitioner at a time when least expected. Definite information along this particular line is limited, not obtainable from text-books, and certainly not available in time of great need. We agree with the author that a work of this character devoted exclusively to this subject will prove of practical value and material assistance to many practitioners.

EDITORIAL.

EXIT INTERSTATE—ENTER MODERN MEDICINE.

With this issue the publication of the INTERSTATE MEDICAL JOURNAL ceases, and in its place MODERN MEDICINE will appear in April, with new and enlarged features.

The change in name and material is in accord with the new and important progress of medical science and organization, now under full headway in this country, and, as a matter of fact, in all civilized countries of the world.

We believe that the INTERSTATE MEDICAL JOURNAL served its purpose well in furthering the cause of scientific diagnosis and treatment of disease. It was a medium through which careful observers, writers, and scientists recorded their conclusions on important medical matters, and through which by means of collective abstracts the best medical literature was presented in brief form for the busy physician. These were and still are important functions. Much that has special value, particularly the collective abstracts of medical literature, will be continued in MODERN MEDICINE, and it is believed that the broader field covered by the new magazine will be appreciated by the subscribers and supporters of the INTERSTATE.

But there is a new call to action for physicians and publishers. The old era—the era of individualistic practice of medicine—is passing away, and in its place is coming a new organization of medical service which is of profound interest to the physician and to the social welfare workers.

This new organization comprises the whole field of preventive

and curative medicine, including all those agencies which promote and condition health as well as those which diagnose and treat disease. To the physician it means the pooling of facilities and skill for the purpose of prevention and cure, and to the public it means the certainty of health and medical care to all as the basis for public welfare.

The new movement is not a conscious effort of any group or organization; it is not planned as a program; it is one of those things which are produced in the crucible of time. It is the culmination of many forces which have wrought for centuries for human betterment. On the one hand, physicians have extended their services into the field of prevention and into the field of charity, and on the other hand health officials have broadened their program from its original purpose of controlling epidemics into one for the prevention of sickness and disability; while the social workers, recognizing that sickness is the root of economic distress, have sought the remedy in preventive and curative medicine.

Altogether, then, three agencies for welfare have pushed the campaign to get at the causes of disease and eliminate them. These efforts have resulted in new and important problems, such as industrial hygiene, physical examination of children and workers, infant and child care, housing, rehabilitation of disabled persons physically and vocationally, and social insurance against sickness and accident.

On the side of organization for complete service we have also the corresponding study and experiment with group practice of medicine, hospitals, dispensaries and clinics, public health organization, public health nursing, industrial medicine, school health supervision, physical education, experimental and diagnostic laboratories.

There is, or should be, a unity in all this program. There is one end in view—the prevention and cure of disability. The converging forces for human welfare, while using different methods, are all working toward that one end. There should be full understanding of common aims and full interchange of all the knowledge which experimentation in subject matter or organization brings.

It will be the aim of MODERN MEDICINE to keep physicians informed of the developments in the fields outlined, and to promote every agency which seeks to apply the scientific results of experiment and research to the prevention and cure of disease.

LOOKING FORWARD.

With this number the INTERSTATE MEDICAL JOURNAL as the profession has known it for a quarter of a century ceases to exist. It reappears with a dress and a mission which are symbolic of the changes that are taking place throughout the world and which are nowhere more sharply reflected than in the affairs of our own profession.

We have been accused, not perhaps without some color of justice, of undue jealousy in our mutual relations. But whatever may have been our shortcomings, we never have been, we never could have been, charged with a selfish attitude toward mankind in general. Alone of all the professions we put forward our most powerful, almost our only united effort, to suppress the very source of our emoluments.

A recent writer of great authority in the matter has said that the accumulated results of governmental activities in the prevention of disease are mere scratching of the ground in comparison with the work of the physician, each in his lonely furrow. It must have been borne in on the consciousness of all of us that here lies the greatest field in the medical future.

The world is taking stock. We must do likewise.

The following heads suggest matters on which we must soon make important decisions.

1. No one of us is capable of carrying the whole burden of medical practice on his own shoulders with satisfaction to himself and to the community.

2. The poor—by charity, the rich—by heavy payments, can each obtain the best medical attention. The class in between has to be satisfied with something less, often with something wholly inadequate.

3. A great deal of sickness is uncared for because the sick are unable to sacrifice the time necessary for treatment.

4. Great impairment of race efficiency is caused by:
   Want of prenatal care,
   Ignorance of parents,
   Venereal disease.

5. An immense and unnecessary loss of labor value is occasioned by the driving methods employed, largely under the ignorant advice of self-styled efficiency experts. The practice has grown up of working out the best there is in a man, and of scrapping him when yet young, as if he were some mere machine tool. This must cease, if for no better reasons than because the supply of raw material is near exhaustion, and because the labor organizations will "Ca' canny."

We are thus faced with a collection of problems which involve the pooling of our diagnostic, therapeutic, and prophylactic re-

sources; the provision, by group clinics, of adequate medical attention for the great middle class; some form of health insurance; legislation and organization for the care of pregnant women and of young children; the abandonment of the ostrichlike attitude toward venereal disease, and straightforward educational and therapeutic grappling with this menace; the close study in collaboration with employers and employed of the question of industrial fatigue.

These are the questions with which the new INTERSTATE proposes to deal. But this journal will not abandon entirely that field in which it has successfully labored for so long. In particular the Collective Abstracts will be continued, and there will be a department for recording and commenting on progress in general medicine.

SOBRIETY AND GENIUS.

That a given result, obtained by experimentation on lower animals, can justifiably be transferred, directly, to the case of human beings is a contention that, in principle, would scarcely ever be upheld. Yet, in practice, particularly when fanatical sentiment, scientific or politicosocial, is enlisted, such direct application is often made and attempted to be forced on us as dogma.

The most glaring instance of this is the dogmatic application of Stockard's results in the breeding of guineapigs from alcoholized parents, to prove the evil hereditary influence of alcoholism on human beings.

And it is characteristic of the fanatical and pseudoscientific spirit in which this polemic is conducted that the fact is invariably suppressed that equally significant experiments on other animals have not only not given the results obtained by Stockard with guineapigs, but have afforded directly contradictory results. If the parties that put forward Stockard's results believed in the validity of their application, they could not refuse equal weight to these other experiments. This would leave the judgment in suspense.

But there is more. Karl Pearson, beyond the possibility of question the greatest living statistician in biometrics, with collaborators, investigated the offspring of thousands of known drunkards in certain cities of the United Kingdom, and compared them with the children of their sober neighbors. It was admitted that the results were expected to be unfavorable to the families of the alcoholics, and indeed much of the data used was collected by temperance organizations. The result was a complete surprise. Yet, at the very outset a little straw showed how the wind might blow. The starting point of the inquiry seems to have been the observation that the eyesight of the children of drunken parents was superior to that of the offspring of sober parents. At first there was an in-

clination to explain this in an *a priori* fashion as due to the greater amount of time spent by the former out of doors. But this explanation was found to be contrary to the facts.

The whole investigation showed that in the United Kingdom the surviving children of drunkards were as numerous as those of sober parents; that they were in many respects physically and mentally superior, and that they were in no way inferior. In particular they were less liable to tuberculosis.

Various explanations have been offered of these surprising but incontrovertible facts. The one favored by the temperate advocates of abstinence is that in the United Kingdom the class of the population which tends to overindulgence in alcohol is precisely that which contains the best elements of the population, and that this is largely due to the high percentage of Scotch parents among the drunkards. This is, of course, the familiar retort, "How much better they would have been if their parents had been sober!" A perfectly legitimate argument.

Biologists incline to the view that the alcohol has a selective toxic effect on the germ cells, and that the threshold of susceptibility is so set in the human germ plasm as to permit of the survival of the fittest cells, who, in the case of sober parents, have no specially large chance of fertilization over those enjoyed by their weaker brethren.

All this is, of course, no argument in favor of alcoholic beverages, still less of inebriety. It is, on the contrary, an indication for sobriety—sobriety of judgment. What it means is that the argument against alcohol must be taken on the right ground—the injury to the individual and to society.

But, needless to say, these results are ignored by the professional prohibitionist, who prefers the history of single families, in which the coexistence of other than alcoholic taint is not disproved.

*   *   *   *

Some foresee a period of artistic decline as the result of prohibition, while others, on similar grounds, fear an outbreak of succedaneous vices.

Not much use has been made of the greatest prohibitionist experiment yet made—that of the Mohammedan world. The Moslem is, by his religion, forbidden to indulge in alcoholic drinks. The overwhelming majority of Sunni Moslems strictly obey this law. The modern Moslem is, on the whole, unprogressive. Nothing but the gross calumnies of interested rivals attributes this to any other element of the religion of Islam. It must not be forgotten that the Arabs and other Saracens kept alight the torch of culture when it had been extinguished in Europe in the blood of barbarian invasions. The opponents of the early Crusaders were civilized and

cultured, while the Crusaders themselves were a horde of unwashed and unlettered barbarians.

Brilliant intellects have arisen among the Mohammedan nations of the Near East—poets, writers, artists. There is no record of one artistic Mohammedan genius of the past or the present who was an abstainer. The two facts are not necessarily related as cause and effect, but their invariable association is interesting. And disquieting?

EDITORIAL COMMENT.

The appearance in this country of cases of encephalitis lethargica renders our extract from *The Lancet* in this month's Current Notes of especially timely interest.

The apparent tying-up of epidemics of poliomyelitis, influenza, and other diseases lends strong support to the epidemiologic views so forcibly expounded in our columns by Dr. D. M. Lewis, of New Haven.

The strike, lock-out, or expulsion, whichever may be the correct name, of a number of nurses at Oak Park, near Chicago, has roused in the public mind interest in the rights of pupil nurses.

Entirely apart from the merits of the two sides of the particular case, for two sides there doubtless must be, it has shocked the public conscience to learn that a pupil nurse who has completed a large part of her course, should she fall under the displeasure of the governing body of the training school, would lose all credit for the time that she has spent in study.

If this is so, it is a scandalous survival.

To place such arbitrary power in the hands of a body of men, usually self-elected, frequently knowing little and caring less of the circumstances, is, in fact, placing the power over the career and reputation of a young woman in the hands of one person, the head of the training school. Now, no one person is fit to exercise such power, even if capable of taking a detached view, still less when so situated that the closeness of the trees inevitably obscures the general view of the forest.

Most usually the decision will rest with a woman. Whatever the qualifications of woman for public office—and they are high—they do not include the ability to take an impartial view of the conduct of other women.

In a similar connection, a woman, who had successfully held posts requiring high administrative ability, remarked to me, as the result of observation and of introspection, "When a woman is at the head of an administration, a suggestion is a complaint, a complaint a personal insult."

It is notorious that interns are much more tenderly treated. In part this is because the hospital authorities, and particularly the staff, are more afraid of—or shall we say more anxious to conciliate—interns, in part because they are men. Should an intern infringe one of the hospital rules—for example, should he take a pupil nurse for a walk—he would, at worst, be suspended. She would be expelled; especially if she were good to look upon.

Now, seeing that what the hospital gets from the pupil nurse is immensely more than it gives; seeing, further, that even pupil nurses have rights, it would seem just that credit for years of work completed should be the property of the pupil nurse, not to be confiscated at the whim of a dictatorial head.

If more disciplinary power is required, this should be conferred on a body of a judicial character and independent composition, appointed by the State Board of Health or some other central authority. Their decisions should be based on a definite code, and should be subject to review by the ordinary courts, as in the case of other administrative decisions affecting property rights.

Allusion has just been made to the rule, prevailing at many, if not at most, hospitals in this country which, with dread sanction, forbids the most innocent social relations outside the hospital between nurses and interns. This is so different from, is so exactly the opposite of, the custom followed and encouraged elsewhere, that one is led to inquire into the cause of the divergence.

Evidently it is not attributable to a higher moral tone possessed by interns and nurses elsewhere, nor to an indifference on the part of their chiefs.

The only difference one can find that might afford an explanation is that, in those other countries, nurses take their walks abroad in the uniform of their hospital. This is not only more becoming than what they would choose for themselves, but it is distinctive of their particular school. So that one says, "There goes Jones with a Guy's nurse, or a Bart's nurse, or a Thomas's nurse," as the case may be.

There can be nothing clandestine about that.

ORIGINAL ARTICLES.

THE PART OF THE ATTENDING PHYSICIAN AND THE INTERN IN THE MAKING OF HOSPITAL RECORDS OF PATIENTS.

By ROGER S. MORRIS, M.D.,

Professor of Medicine in the University of Cincinnati, Cincinnati, Ohio.

To discuss seriously the advantages of having notes on the condition of hospital patients dictated by members of the attending staff would seem, to one accustomed to the practice, to be superfluous, and yet it is probably true that a large proportion of the hospitals in the United States have totally inadequate records of their patients, largely because this measure is neglected by the attending physicians and surgeons.

It is true, no doubt, that ward rounds can be made in less time if no records of the examinations of patients are made. Were hospital wards maintained for the benefit of the attending physicians chiefly, this reason might be valid, for in nearly all instances members of attending staffs are unpaid in money for their services in charity or semifree wards, though there is a large return in the way of professional experience and prestige.

That it is disadvantageous to fail to keep accurate records of patients, not only for the attending physicians, but also for the patient, the intern, and the hospital, I shall attempt to show.

The division of the medical work in a hospital will differ somewhat, according to the organization of the staff. Hospitals fortunate enough to have well-manned resident staffs have, as a rule, the best type of attending staff; the records typify the kind of work done, and are thorough and complete. Where no resident staff exists, or where, if existent, it is undermanned, the work of compiling the medical records devolves on the interns and the attending physicians and surgeons. That the major part of the work should fall to the lot of the attending or visiting staff members cannot be successfully controverted; that the bulk of the record is compiled by the intern, with little or no supervision or assistance, is often the sad fact. It is the work of the latter type of hospital staff, consisting of attending staff and interns, with no resident staff or an inadequate one, which it is my purpose to discuss.

With such a staff the medical work should be subdivided, I be-

lieve, in the following manner: when a patient is admitted to the ward, the intern or the senior medical student in a teaching hospital should take a complete medical history of the patient within two to three hours after admission; on the completion of the history the intern should make and record a complete physical examination (preferably not by filling in a printed outline, for this often leads to slipshod, perfunctory work), and as soon as practicable thereafter he should make the necessary routine laboratory examinations. The record should be practically complete and ready for submitting to the attending physician at his next daily visit.

The attending physician, having the record of a new case thus submitted, too often reads it with little or no comment, makes a hurried examination of the patient *in silence, adds nothing to the record*, and passes to the next bed. It is no doubt often beneficial to the attending physician, but how much more he would gain by it if he had his own physical examination, with exact data, to refer to later—his own additional notes on the history of the case! Furthermore, the patient, the intern, and the hospital are all entitled to it, and the hospital should demand a physical examination of each new patient, dictated by a member of the attending staff. The name of the physician making the examination, together with the date of the examination, should, of course, always form a part of the record.

Having completed the dictation of his examination of the patient, the attending physician should then add his impression or tentative diagnosis of the case, and should indicate, when necessary, further examinations or studies required to arrive at a diagnosis.

During the patient's stay in the hospital the attending physician should dictate the details of any important changes in the patient's condition, and also any change from the first tentative diagnosis which further study may necessitate. Likewise, changes in condition noted by the intern when making rounds without the attending physician should be fully recorded, the date and the name of the examiner being placed in the record. There are many advantages to be gained from such a system of keeping records of hospital patients—advantages which accrue to the attending physician, to the patient, to the intern (and to students if any are present), and to the hospital.

An attending physician who dictates full records of his examinations is constantly cultivating accuracy of observation, and cultivating it in such a way as to make it valuable, not only to himself, but to others. Should he desire to study a group of cases of a given condition, he has at his disposal records on which he can rely. Or, if members of the staff are engaged in statistical studies, it is possible to assemble a number of histories with detailed records and to know who made the observations recorded. It cannot be too

greatly emphasized that the details of the physical findings should be given when the notes are dictated. It is not enough to say that "signs of fluid in the right pleura are present," or that there is "evidence of infiltration of the right lower lobe." The signs which lead to such a conclusion should be detailed.

An intern associated with a physician who is constantly dictating to him notes on his cases is helped in that he forms a habit which will be invaluable to him later in his private practice. Furthermore, he has the great advantage of being able to compare his own findings with those of the attending physician, learning much in the way of physical diagnosis. With no such stimulus from his attending physician, the work of the average intern becomes careless, he performs his duties with the least possible effort, loses initiative, and sinks to the level of mediocrity.

Again, when both attending physician and intern record physical examinations with tentative—and, later, final—diagnoses, they are prepared, in the only adequate way, to profit by what is revealed at autopsy in fatal cases. With no records and only hazy recollections, in which details of examinations are lacking, there is no basis for study to prevent mistakes in diagnosis in future cases; and if one is not to profit in professional knowledge by working in a hospital ward, why waste one's time at it?

In the case of rotating services, a scheme which still survives in many hospitals, the need of complete records, particularly at the time when the staff changes, is evident. Likewise, when a consultation is requested, it is often the case in hospital practice that the consultant arrives at an hour when the physician who requested the consultation is absent. If a complete record of the case is at the bedside, the consultant quickly obtains all the essential facts in the case. Where no such record exists, or when the record is poor, the consultant must take the time necessary to obtain a history and make a physical examination, and even then he may be without essential facts, such as the results of a spinal puncture or a thoracentesis or the description of an attack of angina pectoris, or of an intercurrent infection, for example.

As previously mentioned, records made in the manner indicated above are valuable for later study and for publication. They are also useful, when needed, for evidence in court.

That the patient is the gainer when his case is carefully studied is patent. It is mentally impossible to remember the details of each patient in a service, and the physician who says he can do so has no means of knowing how much he forgets. But he does forget, and the patient is one of the losers. How often a diagnosis may be cleared up by a change, often slight, in physical findings. The sooner the correct diagnosis is made, the shorter the patient's stay in the hospital, as a rule. Thus the hospital saves unnecessary

hospital days, with a consequent decrease in cost of maintenance. With earlier diagnosis, too, the administration of much useless medication is eliminated.

It is, and should be, the aim of every hospital to have the most able and efficient staff it can obtain. Too often the hospital administration knows little or nothing of the work of the attending staff. When the members of the staff leave no record of their work in the wards, except perhaps the hour of their daily arrival and departure, how is it possible to assess their values? There is practically nothing, in most instances, except hearsay, on which a just conclusion can be based. A full record of their examinations of its patients is the least a hospital should demand, and obtain, from its attending physicians and surgeons. When the time of an attendant becomes so valuable that he cannot afford to use it for dictating the results of his examination of hospital patients, then the attendant no longer needs the position, and the hospital in the end would be the gainer by substituting for him a less busy man who would keep accurate notes of his patients.

X-RAY EXAMINATION OF THE HEART AND GREAT VESSELS.

By G. W. GRIER, M.D., Pittsburgh, Pa.

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Information pertaining to the heart obtainable by x-ray examination may be divided roughly into two classes: 1, facts regarding the size, contour, and location of the heart; 2, facts regarding the pulsations of the heart and the influence of respiratory movements on the heart.

The latter facts are ascertainable only by the use of the fluoroscope, while the facts cited in the first division may be determined either by the use of radiograms or by the fluoroscope. In considering the size of the heart, there are only three conditions possible—too small, normal, or too large. I have seen only two cases in which one could say unquestionably that the heart was too small to perform properly its functions. Both these cases were in adults, one male and the other female; both were ordinary-sized individuals, one about 40 years of age and the other younger. The heart in each instance was about the size of a base ball or possibly a trifle larger. These individuals were both very much handicapped, any exertion whatever being out of the question, even fast walking being impossible. The man died suddenly about two years after I saw him. At last accounts the woman was living and in her usual state of health. I am sorry I am unable to show illustrations of these two cases.

The normal heart may vary in size between rather wide limits. For purposes of description, three divisions are very convenient: 1, the small vertical heart of the asthenic individual; 2, the medium-sized and obliquely placed heart of the average-sized individual; 3, the large, transversely placed heart of the large individual or the athlete. The athletic heart is often hypertrophied, and possibly should be classed as abnormal, especially in later life, when the athletic activities have ceased.

The small "drop" heart is well known—it is centrally placed, and its long axis is practically parallel to the long axis of the body. It occurs in thin individuals with long chests, and is supposed to indicate a predispositon toward tuberculosis of the lungs. Its vertical position is undoubtedly due to an unusually long chest, just as the transverse heart in the fat person is due to a very short chest. Deep expiration, by the ascent of the diaphragm, has a

tendency to convert the vertical heart into one of the oblique variety, and deep inspiration, by the descent of the diaphragm, has a tendency to convert the transverse heart into one of the oblique variety. These facts would suggest the thought that the individual with the vertical heart has possibly a habit of insufficient expiration and the one with the transverse heart a habit of insufficient inspiration.

The medium-sized heart varies quite considerably in size, shape, and obliquity, having individual characteristics about as common as one's nose.

The right ventricle is not seen in a radiogram of the heart, being covered by the diaphragm. In the oblique heart now under discussion the right auricle projects to the right of the spine about 1 inch. It describes a decided curve, and merges into the shadows of the aorta and vena cava above and of the diaphragm below. The left ventricle forms the greater part of the heart shadow seen to the left of the spine. A little bulge above the left ventricle represents the left auricle, and above this another bulge is made by the pulmonary artery. Above the pulmonary artery is seen the descending aorta and the aortic arch.

In the large transverse heart the long axis of the heart is nearly at right angles to the long axis of the body. This position is caused by a short chest and a high diaphragm, which lifts the apex of the heart upward and allows the heart to lie with practically the entire right side in contact with the diaphragm. The hypertrophied heart is also more or less transverse, due to an increase in size of the left ventricle. The transverse heart is large for two reasons— either it occurs in large stout individuals, who naturally have a large heart, or else it is a hypertrophied heart.

Hearts that appear too large are either hypertrophied, dilated, or the heart shadow may appear large on account of pericardial effusion. Hypertrophied hearts we have already considered under the title of large transverse hearts.

The dilated heart may be enlarged in any or all of its chambers. The generally dilated heart occurs from valvular lesions, with loss of compensation. Practically all the dilated hearts I have seen in young children have been of this type. A dilatation of only the right side of the heart, seen by x-ray (Fig. 1), means a dilatation of the right auricle, and occurs in tricuspid lesions, either regurgitant or stenotic. A dilatation of the left side of the heart occurs in mitral lesions or in aortic lesions. Usually in mitral lesions, with loss of compensation, the entire heart is dilated. The first chamber to dilate in mitral lesions, however, is the left auricle. The left ventricle will also be large—first from hypertrophy and, later, after loss of compensation from dilatation. In aortic lesions, only the left side of the heart is affected.

Pericardial effusion (Fig. 2) causes an increase in the size of the heart shadow, with an obliteration of the curves identifying the various chambers of the heart. The heart shadow becomes roughly triangular, with the apex above and the base below. The outlines of the heart shadow approximate straight lines instead of curves. The heart shadow changes shape somewhat on changing the position of the patient.

Alterations in the contour of the heart occur from increased

Fig 1. Extreme dilatation of the heart in a child.

size of any or all of the chambers of the heart, and have just been considered. The heart may be displaced from various causes. Pleurisy with effusion, old pericarditis with adhesions, old pleurisy with adhesions, fibroid phthisis, tumors in the mediastinum, and subphrenic abscess are a few of the etiologic factors.

By means of the fluoroscope the action of the heart may be watched, and occasionally information is obtained that might otherwise be overlooked. The rapidity and vigor of the pulsations are, of course, noted.

Arhythmia is occasionally seen. I have fluoroscoped one case

of heart block, and the demonstration was very beautiful. The slow, massive contractions of the left ventricle occurred about twenty times to the minute, while the contractions of the right auricle were so rapid as to almost challenge the power of the eyes to follow them. Adhesions of the pericardium to the diaphragm in the region of the apex are occasionally seen by fluoroscopic examination; on deep inspiration the point of adhesion can be plainly seen. While there is probably no information regarding heart pulsations obtain-
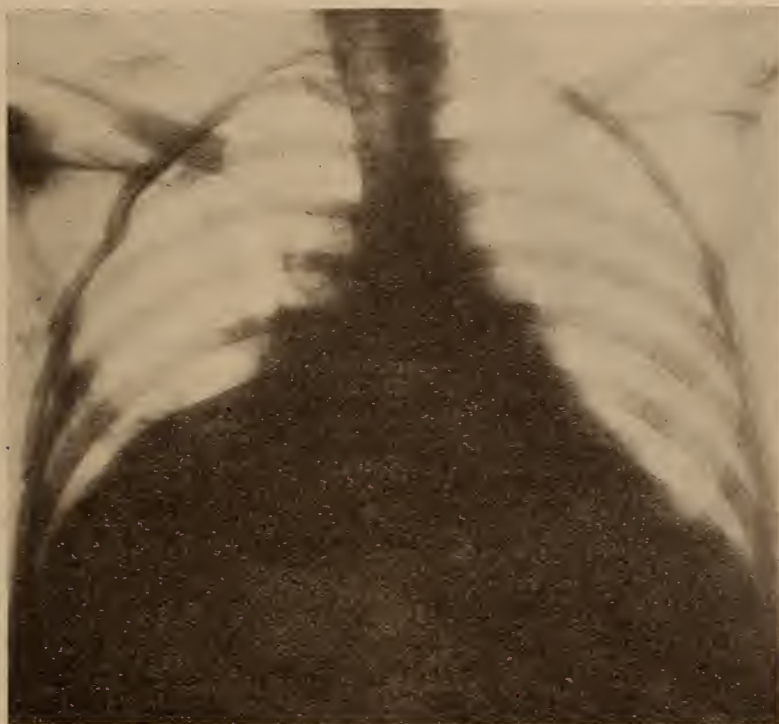
·Fig. 2. Pericardial effusion. Note triangular shape of the heart-shadow.

able by x-ray examination that is not also demonstrable by clinical methods, yet the visualization is often very reassuring. When, however, we come to consider the size and contour of the heart, the x-ray has distinctly the advantage.

We all have seen time and again examples of the impossibility of percussing accurately the outlines of the heart, even by the best clinicians. Particularly is this so in demonstrating enlargements of only one chamber of the heart; also in instances where there are enlarged lymphatic glands lying close to the heart, as often happens on the right side of the mediastinum. Above and merging into the shadow of the heart is the shadow cast by the great vessels. These are the vena cava, the ascending aorta, arch, and descending aorta. The shadow cast by the vena cava lies farthest to the right.

The shadow of the ascending aorta is to the left of it and cannot be separated from it. The arch caps the shadows of the ascending and descending aorta. It describes quite a sharp curve and always bulges out to the left of the shadow of the spine, forming quite a prominence sometimes mistaken by the uninitiated for aneurysm. The left border of the ascending aorta is seldom seen, but both borders of the descending aorta can usually be made out. The ascending aorta is quite frequently dilated for its entire length—that is, it is broadened. This broadening is entirely different in appearance from the sac-like protrusion of an aneurysm. There is no bulging—simply a widening of the caliber of the vessel. I have no statistics on the subject, but believe this condition is suggestive of syphilis, probably to the same extent as is aneurysm.

Aneurysm of the ascending aorta without involvement of the arch is occasionally seen as a sacculated protrusion of the right border. Large aneurysms of the arch are always continued into both the ascending and descending aorta. Small aneurysms may involve only the arch. Aneurysms involving only the descending aorta are occasionally seen. Also, but more rarely, one sees aneurysm of the innominate artery. In these cases the recurrent laryngeal nerve is usually affected. The differential diagnosis between aneurysm of the aorta and solid tumors in the mediastinum is not easy. Both fluoroscope and radiograms should always be used. The point of differentiation on which most stress has been laid is that in aneurysm there is an expansile pulsation to the tumor. In practice it is extremely difficult to distinguish the expansion of an aneurysm from the pulsation transmitted to a solid tumor from the pulsation of the heart. If a diagnosis is made on this point alone, many errors will result. The borders of an aneurysm are always smooth and convex. Outside of malignancy of the mediastinum, which has much the same appearance, other solid tumors are apt to be more or less irregular and knobby. Malignancy sufficiently advanced to have a mass in the mediastinum large enough to be mistaken for aneurysm is usually accompanied by metastases in the lungs easily recognizable. By rotating the patient sidewise before the fluoroscope, and thus bringing into view the anterior and posterior borders of the aorta, aneurysm can often be differentiated from other tumors, as the symmetrical dilatation of the aorta can thus be seen. Enlarged mediastinal glands from tuberculosis, syphilis, leukemia, and Hodgkin's disease cannot be differentiated from one another by the appearance of the tumor masses.

The x-ray changes in the lungs in these conditions are somewhat different, and may be sufficiently characteristic to make the diagnosis between them, or the differential diagnosis may be made by clinical methods. The main point in differentiation will be between enlarged glands and aneurysm. In aneurysm, as before

stated, the outlines are smooth and convex, while in enlarged glands they are apt to be somewhat irregular. Also, on rotating patient in aneurysm, the tumor is seen to be continuous with the aorta, while the enlarged glands are more or less lost behind the shadow of the spine. If the masses of glands are very large and smooth in contour, it may be impossible to differentiate in this manner, in which event, if the character of the pulsations is not diagnostic, and there are no changes in the lungs to indicate a constitutional disease, the diagnosis cannot be made by x-ray examination alone.

The differential diagnosis of thymus or substernal thyroid is easier, as in these conditions the tumor lies above the arch. They might be confused for an aneurysm of the innominate artery, but the appearance and location of the shadows are decidedly different. The thymus or intrathoracic thyroid lies in the midline, while the innominate aneurysm lies to the right side of the sternum; also, the borders of the thymus are more apt to be concave or straight than bulging, as is seen in aneurysm. Having carried the diagnosis so far, it should easily be confirmed clinically in such widely differing conditions.

METABOLISM STUDIES IN A CASE OF BRONCHIAL ASTHMA.

By JACOB ROSENBLOOM, M.D., Ph.D., Pittsburgh.

I. INTRODUCTION.

No work has been done regarding the study of the metabolism in cases of bronchial asthma. The recent studies showing the relation of anaphylaxis[1] and of the amins[2] to conditions similar to bronchial asthma make this subject of more than ordinary interest.

II. METHODS.

The patient, an adult female, subject to bronchial asthma for a period of five years, was kept on the Purin-Free Folin diet for five days. The analyses were started on the second day of the diet. The methods used were the same as those mentioned in former papers.[3] The aminoacids were estimated by the Benedict-Murlin[4] method.

Tables I, II, and III contain the results obtained in this study.

It can be seen from a study of table I that the nitrogen metabolism of this patient may be considered normal. The urea, ammonia, creatinin, uric acid, aminoacids, and undetermined nitrogen are also normal in amounts and in percent of the total nitrogen.

Table II shows that the sulphur metabolism is also normal. The total sulphate sulphur, inorganic sulphate sulphur, ethereal sulphate sulphur, and neutral sulphur are also normal

Table III shows that there is a tendency for a loss of calcium in this patient. This is also true to a lesser degree as regards the magnesium and phosphorus. In the four days of the metabolism study there is a loss of 1.43 grams of calcium oxide, 0.51 grams of magnesium oxide, and 0.25 grams of phosphorus.

It is possible that the value of calcium[5] in the treatment of bronchial asthma bears some relation to the loss of calcium in this condition as was found in this case reported here.

Jenkins Arcade.

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TABLE I.   THE NITROGEN METABOLISM AND URINARY NITROGEN PARTITION.

| Day | Amount | Total nitrogen | Urine¹ | | | | | | | | | | | | | | | | Feces nitrogen | | Intake nitrogen | Balance nitrogen |
| | | | Urea nitrogen | | Ammonia nitrogen | | Creatinin | | | Uric acid | | | Aminoacid nitrogen | | Undetermined nitrogen | | | | | | |
	c. c.	gm.	gm.	Percent of total nitrogen	gm.	Percent of total nitrogen	gm.	Nitrogen gm.	Percent of total nitrogen	gm.	Nitrogen gm.	Percent of total nitrogen	gm.	Percent of total nitrogen	gm.	Percent of total nitrogen	gm.	Percent of nitrogen intake	gm.	gm.
1	1730	12.1	9.9	81.8	0.45	3.7	1.5	0.55	4.5	0.34	0.11	0.91	0.40	3.3	0.55	4.5	1.58	13.1	13.60	—0.08
2	1440	12.6	10.4	82.5	0.49	3.9	1.14	0.42	3.3	0.30	0.10	0.80	0.47	3.1	0.62	4.9	1.58	12.5	13.75	—0.43
3	1700	12.5	10.4	83.2	0.72	5.7	1.15	0.42	3.4	0.26	0.086	0.70	0.30	2.4	0.46	3.7	1.58	12.6	13.82	—0.26
4	1820	12.2	10.2	83.6	0.57	4.6	1.18	0.43	3.5	0.34	0.11	0.90	0.32	2.6	0.46	3.8	1.58	12.9	13.48	—0.30
																				—1.07

¹Urine was free from creatinin throughout.

TABLE II. THE SULPHUR METABOLISM AND URINARY SULPHUR PARTITIONS.

		Urine											
Day	Sulphur gm.	Total sulphate sulphur		Inorganic sulphate sulphur		Ethereal sulphate sulphur		Neutral sulphur		Feces sulphur gm.	Intake sulphur gm.	Balance sulphur gm.
		gm.	Percent of total sulphur	gm.	Percent of total sulphur	gm.	Percent of total sulphur	gm.	Percent of total sulphur			
1	1.00	0.85	85.0	0.75	75.0	0.10	10.0	0.15	15.0	0.35	1.4	—0.05
2	1.03	0.92	89.3	0.84	81.5	0.08	7.8	0.11	8.7	0.35	1.2	—0.18
3	1.11	0.98	88.3	0.92	82.9	0.06	5.4	0.13	10.4	0.35	1.45	—0.01
4	1.00	0.96	96.0	0.90	90.0	0.06	6.0	0.04	4.0	0.35	1.25	—0.10
												—0.34

TABLE III. THE CALCIUM, MAGNESIUM, AND PHOSPHOROUS METABOLISM.

	Urine			Feces			Intake			Balance		
Day	Calcium oxide gm.	Magnesium oxide gm.	Phosphorus gm.	Calcium oxide gm.	Magnesium oxide gm.	Phosphorus gm.	Calcium oxide gm.	Magnesium oxide gm.	Phosphorus gm.	Calcium oxide gm.	Magnesium oxide gm.	Phosphorus gm.
1	1.21	0.24	0.92	2.0	0.10	1.2	2.4	0.48	2.4	—0.81	—0.14	+0.28
2	1.06	0.24	1.35	2.0	0.10	1.2	2.7	0.46	2.2	—0.36	—0.12	—0.55
3	0.88	0.20	1.18	2.0	0.10	1.2	2.9	0.41	2.0	+0.02	—0.11	—0.38
4	1.10	0.20	1.20	2.0	0.10	1.2	2.82	0.44	2.8	—0.28	—0.14	+0.40
										—1.43	—0.51	—0.25

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ORTHOPEDIC RECONSTRUCTION WORK OF THE HAND.

By ARTHUR STEINDLER, M.D., F.A.C.S., Iowa City, Iowa.

In the course of treatment of a series of paralyzed, contracted, and deformed hands and fingers we have been able to observe and study certain points of anatomical, physiological, and mechanical nature, and to apply them subsequently as guides for surgical procedures. In the following some of these points will be explained and their application to certain clinical cases considered.

1. *Position of the Wrist and Gripping Power of the Fingers.*— That there is a certain relation between the gripping power of the fingers and position of the wrist is now being sufficiently recognized. Robert Jones has pointed out that the most favorable position of the wrist, from the viewpoint of finger action, is that of hyperextension. In a recent study I have tried to prove this point on an experimental basis. It is equally well known that the worst position for the wrist, in regard to the fingers, is that of forced flexion. Flexion contraction or ankylosis of the wrist directly incapacitates the grip by allowing the flexor muscles of the fingers to contract or to relax to, or very near, a point beyond which further contraction is impossible. When the wrist has reached its maximum of flexion, most of the contraction power of the fingers has also been exhausted. Furthermore, flexion position simultaneously increases the tension in the extensor muscles, both of the wrist and of the fingers, causing forceful extension in the metacarpophalangeal joint and in the interphalangeal joint.

2. If the fingers are also involved in flexion, then the force of the flexors will, at a certain point, become entirely exhausted, leaving the metacarpophalangeal joints entirely to the action of the enormously increased tension of the extensor muscles. By this mechanism these joints will be forced into hyperextension and a claw hand will result, such as we see typically in Volkmann's contracture and other pathological conditions.

3. *Paralytic Drop Hand.*—Here again the position of the wrist is of paramount importance. But it is here not only the question of correcting the drop hand position of the wrist, but also of maintaining the wrist in this corrected position. This extension of the wrist might be secured in two ways:

(a) By tendon transference, imparting action to the extensors of the wrist, resulting in the power of active extension.

(b) By stiffening of the wrist, arthrodesis.

While the first procedure would naturally be the method of choice,

there are only very few cases that have enough healthy muscle material left to render this method practical. In the large majority of cases the available muscle material is by far too insufficient to secure both motion and stability of the wrist. In this situation, it must be emphasized, the choice must fall on the stability of the wrist when only one of the two requirements is obtainable.

4. Frequently the mistake is made of transferring muscle power directly from the flexor of the wrist to the extensors in cases of drop hand, as, for instance, in musculospiral paralysis. Unless one takes care first of the stability of the wrist joint in extension, either by tendon transference or much more frequently by arthrodesis, this direct transference of muscle power from the wrist to the extensors of the fingers will serve no purpose, and is contrary to the mechanics of the hands and wrist. On the other hand, it is entirely permissible to perform such transference after the wrist joint has been properly taken care of.

5. After proper handling of the wrist joint, the question of the position of the metacarpal phalangeal joint is next to be considered. The hyperextension, which is found in claw hand deformity, interferes greatly with the function of the hand. In cases of Volkmann's contracture, and other instances of claw hand deformity, the release of the contracted flexors of the wrist and fingers also gradually releases the claw hand deformity. But in many instances the claw hand contracture in the metacarpal phalangeal joint is due to secondary changes of the extensors or inflammatory changes of the dorsum of the hand. In the first instance plastic work of the extensor tendons may release the hyperextension, but in the latter instance the shrinkage of the fibrous structures may be such that tenoplastic work may be of no avail. If confronted with this situation, one must realize that action in the metacarpophalangeal joint is of greatest importance, and therefore motion must not be destroyed by any interference at the joint proper. Our method, therefore, has been to carry out a juxtaarticular osteotomy for correction of deformity of this kind in cases not amenable to tenoplastic work.

6. For the gripping action of the hand the play of the thumb against the fingers is also a very vital point. I have found frequently in paralytic cases that the lack of opposition of the thumb was a great obstacle in the functional reconstruction of the hand. Almost all other muscles of the thenar might be more easily substituted by the long forearm muscles than the opponens pollicis. These cases were improved by a tenoplasty, in which the flexor pollicis longus was split longitudinally and a second point of insertion was provided for the outer half, so that the tendon displayed a combined action of flexion and opposition.

7. On the other hand, the inability to extend the thumb on clos-

ing the fingers also creates a very disturbing situation, as the thumb is, in this case, thrown under the fingers at the beginning of gripping motion, and there is, therefore, no oppositon. To remedy this, a method of tenoplasty has been used which was devised by Biesalski and Mayer, and by which the flexion action of the thumb is checked.

8. A condition not directly affecting the wrist proper, but bearing on the function of the hand and fingers, is the position of pronation contraction, which is found frequently not only in cases of Volkmann's contracture, but also in paralytic and especially in spastic cases. A simple tenotomy of the pronator teres muscle will not do, as the muscle reunites quickly. It is necessary either to do a total resection of this muscle or a transposition according to Robert Jones.

9. A further point, although not governing the wrist joint proper, but of direct importance to the function of the hand, is the ability to raise the hand to the horizontal. We have, therefore, to take up the question of elbow paralysis from the viewpoint of reestablishing the function of the hand, and for these cases a suitable plan of operation was devised. The method is one of muscle transposition, in which the flexor muscles are carefully dissected off the common point of origin at the internal condyne of the humerus and subsequently transposed 2 inches higher up to the external condyle of the humerus and fastened to the periosteum or the intermuscular septum. The procedure makes a two-joint muscle out of the forearm muscles. If the flexor muscles are sufficiently stabilized by holding the wrist tight in extension, their contracture will display enough strength to flex the elbow. It is obvious, however, that in this case the strength of the flexor muscles of the hand must be almost normal.

10. A number of methods for plastic work were employed for cases of scar contractures, either acquired or congenital, or for congenital deformities, such as club and web hand deformities. In scar contractures without involvement of the musculature it was not difficult by plastic methods to restore the entire function of the hand. In club hand deformity, however, great difficulty is encountered in cases of developmental defects. It is remarkable that lateral deviation of the hand does not interfere with the function of the hand nearly as much as flexion contraction, as we have seen in several cases of club hand deformity.

In the following I report a series of cases, divided in groups corresponding to the classifications made above.

1. Simple flexion contraction, 10 cases. Of these 10 cases 6 were spastic paralysis, in which were employed tenoplastic work of the flexors of the wrist and subsequent mechanical after-treatment. Of the others, 1 was a case of neuritic contraction, which yielded to bloodless correction. 'Another was a

case of finger contraction following tendosynovitis, relieved by bloodless methods, and a third was a case of tendosynovitis, relieved by tenoplastic methods. The fourth was a case of flexion ankylosis following osteomyelitis. In this case a resection of the wrist was done.

2. Flexion contraction with claw hand deformity. Six cases of Volkmann's contracture. These cases yielded to tenoplastic methods and subsequent after-treatment.

3. Drop hand deformity; 4 cases—1 paralytic and 3 spastic. Two cases were corrected by arthrodesis and 2 by tenoplastic operations.

4. Drop hand deformity and drop fingers; 5 cases. In all these cases arthrodesis was performed to give the wrist extension position, and was then followed by transference of the flexors of the wrist to the extensors of the fingers. The only method found reliable was transplantation of the flexor carpiulnaris to the extensors of the fingers directly through the interosseous space; 4 cases.

5. Claw hand following inflammatory changes of the dorsum of the hand or myositis of the extensor muscles; 2 cases. These cases were not amenable to tenoplasty work, as hyperextension of the metacarpal phalangeal joint could not be corrected. In these cases an osteotomy of the metacarpals was performed ¾ inch proximal to the joint line, and then the distal part of the bone kinked forward so as to diminish the claw hand position of the joint.

6. Thumb plasty for lack of opposition; 4 cases. In all cases opposition of the thumb was obtained. The flexor pollicis longus was split longitudinally and the outer half fastened to the outer side of the base of the proximal phalanx of the thumb.

7. Inability to extend the thumb; 6 cases. Spastic paralysis. In all cases a plasty of the thumb was performed by reinforcing it with the extensor of the index finger. All cases gave good result, with the exception of one, in which the throwing under of the thumb recurred.

8. Pronation contraction; 3 cases. The pronator teres was resected in 1 and transposed in 2 cases. The result was good in 2 cases and poor in 1.

9. Elbow plasty; 9 cases. The plastic method to procure active flexion in paralyzed elbow, as indicated above, was performed in 9 cases, in which good results were obtained in 5 cases; 2 cases are still under observation, 1 case is a failure, and 1 case died of influenza pneumonia.

10. Scar contractures and congenital deformities; 11 cases. Four of these cases were cases of congenital club hand and 2 of acquired club hand deformity. One club hand case was improved by osteotomy and the other under conservative treatment. Both acquired cases improved by osteoplastic method of bone graft. The scar contractures were improved by ordinary methods of skin plasty.

VERTIGO AND FOCAL INFECTION.

By ALBERT E. TAUSSIG, M.D., St. Louis.

The work of Bárány and, more recently, the contributions of Isaac H. Jones and his colleagues have removed from the problem of vertigo much of the mystery that long surrounded it. A careful study of the patient by means of the otoneurological tests will often enable us to localize the source of the vertigo with considerable definiteness. This is, however, by no means always the case. A large group of sufferers from vertigo remain in whom the determination of the cause of the dizziness is a matter of much difficulty. These are the cases which we are tempted to call neurotic or neurasthenic vertigo, a terminology which is merely a confession of our inability to make a diagnosis.

The subjective perception of vertigo in general takes on one of two forms. Surrounding objects may appear to spin about the sufferer in an approximately horizontal plane, or, if one closes his eyes, he may have a sensation of himself being turned in the opposite direction. This form of vertigo is most often accompanied by nausea and vomiting. Often, however, there is no sensation of the whirling about of the external objects at all, but merely a distressing sensation of instability. Sufferers from this form of vertigo apparently find it difficult usually to describe their sensations accurately, but one often gets a fairly definite statement that, instead of whirling, the ground seems to be rising and falling more or less rhythmically, or the patient himself, if he closes his eyes, feels himself swaying from side to side. The sensation seems to be much like what we have all experienced on landing after a rough ocean voyage.

The physiologic maintenance of equilibrium depends on the proper coordination, in the brain, of afferent impulses from four sets of sensory organs. The most important for this purpose is the vestibular portion of the inner ear. With the saccule and the utricle giving us information regarding the direction of gravity, and the semicircular canals informing us as to the direction and speed of our head movements, the labyrinth forms the essential organ of equilibrium. Second in importance are the eyes. The part they play in maintaining equilibrium may be illustrated by Romberg's sign— the tabetic can keep from falling only with the assistance of his vision. The third and fourth groups are the muscle-tendon joint senses and the touch-pressure senses respectively. All of the organs send continuous impulses to the brain, at least during our waking hours. These impulses are then coordinated and inform us about

our position and motion in space. When this coordination is perfect, we are not even conscious of our equilibrium; when it is disturbed, we have the sensation we know as vertigo. Vertigo may thus be considered as the confusion resulting from the coming into consciousness of afferent impulses concerned with equilibrium, which ordinarily are associated, but now, for some reason, have become dissociated. As the labyrinth is the main organ of equilibrium, even minimal affections of it, or of any portion of its nervous connection with the cortex, may cause the most violent vertigo. Ocular defects cause vertigo more rarely, though cases have been described in which the dizziness was apparently due to eye strain and was relieved by suitable glasses. A disorder of the nuclei that intervene between the retina and the cortex is probably a more frequent cause of vertigo.

Theoretically, abnormal impulses from the muscles, tendons, joints, or even the skin might cause dizziness, though I know of no case in which these senses could be held responsible for the vertigo. It may be that in tabes the instability of the body depends, at least in part, on this factor. In any event, a disturbance of the labyrinth, or of its nervous connections, is responsible for almost all cases of vertigo, and we shall not often be in error if, in any case of vertigo, we assume, at least provisionally, that the labyrinth or its nerve paths are at fault.

Much information regarding the condition of the labyrinth may be obtained from the well-known Bárány tests, with the modifications introduced by Jones and his coworkers. They consist in testing the response of the patient to artificial stimulation of each labyrinth. This stimulation may be produced by rotating the patient in a chair, douching the ear with cold or hot water, or applying the galvanic current to the temporal bone. When the labyrinths are normal, this stimulation produces perfectly definite responses on the part of the patient—vertigo, a tendency to fall in the direction of rotation, nystagmus in the opposite direction, and past-pointing in the same direction. When these phenomena are observed, we may be sure that the vertigo is not due to a destructive process in the labyrinth. When, however, these responses fail after stimulation of either labyrinth, we may feel sure of the presence of some lesion of the internal ear, usually either a temporary toxic process or a permanent degenerative process in the vestibular portion of the eighth nerve. If, finally, the patient gives some of the reactions, but not others, there is reason to suspect some intracranial lesion.

In discussing the relation of vertigo to internal disease, the large group of cases in which the giddiness is due directly to disease of the external, middle, or internal ear must be excluded. If we also disregard the cases in which the vertigo is due to intracranial dis-

ease, we have left only conditions in which the vertigo is caused by a disorder of some other more or less distant organ. A common example of this form of vertigo is that seen in cardiovascular disorders, especially hypertension and arteriosclerosis. In spite of the frequency of their occurrence, these cases have received but little attention from otoneurologists. Thus Jones, in a recent discussion of vertigo, merely refers to them in these words: "Cardiovascular irregularities may produce vertigo by causing ischemia or hyperemia of any part or parts of the ear mechanism, either within the internal ear itself, or its intracranial pathways, or in its associated centers of the cerebral cortex." Obviously, this is little more than a confession of ignorance. This kind of vertigo is commonly seen in elderly men with hardened arteries. At times, on stooping to tie their shoes, or more often on arising suddenly from a stooping posture, or indeed on turning in bed, they perceive an annoying degree of vertigo, usually without nausea or vomiting. The disorder ceases spontaneously after a few days or weeks, but may recur. We used to call them cases of cerebral arteriosclerosis, and assume that they were due to a maladjustment of the intracranial circulation on change of posture. The fact that most extreme arteriosclerotics show no such vertigo rather speaks against this explanation. It is far more likely that the trouble is in the labyrinth, an assumption that is borne out by the results of otoneurologic analysis in the relatively few cases of this kind that have been so examined.

An illustrative case is that of Miss S., aged 69 years. Except for typhoid ten years ago, she had never been seriously ill. Some two months ago she sat up in bed one morning and immediately experienced severe vertigo, which compelled her to lie down again. About 11 o'clock she had a still more violent attack, and ever since had had frequent milder attacks, especially when getting up or lying down. The vertigo was never accompanied by nausea or vomiting. When seen on October 1, physical examination was practically negative except for a faint systolic blow at the apex and a high degree of arteriosclerosis. The blood pressure was 155 and 85 mm. Hg.; the urine was normal. The tonsils were negative, as were the teeth films, and there was no evidence of focal infection anywhere. She was given nitroglycerin in moderate doses, with prompt disappearance of the vertigo. The latter has recurred occasionally from time to time, but has always yielded promptly to the nitroglycerin. She has unfortunately refused to submit to an otoneurological examination.

The vertigo that accompanies marked arterial hypertension is apt to be more severe, and in my experience occurs more frequently. Of these patients also I have unfortunately not been able to persuade

any to submit to the Bárány tests. A couple of illustrative cases must suffice.

Mrs. M., aged 53 years, consulted me last February. The past history was without significance. For two years she had had occasional violent attacks of vertigo, during which surrounding objects appeared to whirl about her in a vertical direction. The attacks were accompanied by vomiting, and, if she stooped during this time she was apt, as she put it, to keel right over. The paroxysms had become more violent and more frequent of late. Physical examination showed a large heart, snapping aortic closure sound, and a blood pressure of 230 to 120 mm. Hg. The urine was normal. There was no evidence of focal infection anywhere. She was given spirits of glonoin in increasing doses and instructed to take it in doses just insufficient to produce headache. While there was no definite fall in blood pressure, the vertigo ceased, and, when I last saw her, had recurred only mildly and at long intervals.

Mr. O. has been under observation since March, 1916. He presents a typical case of hypertensive cardiorenal disease, with angina pectoris. His blood pressure fluctuates in the neighborhood of 200 mm. Hg., with a diastolic pressure of 120 mm., without much arterial hardening. Occasionally he has violent attacks of vertigo, sometimes with and sometimes without vomiting. He is excessively sensitive to nitroglycerin, 1/200 grain producing severe headache. He expresses himself as certain, however, that nitroglycerin gives him prompt relief from the vertigo.

Mrs. K., aged 55 years, multipara, was first seen three years ago. She gave a history of general good health, except for violent attacks of vertigo, with excessive vomiting, the attacks lasting six to eight hours and followed by great prostration. A careful examination in hospital showed no ear involvement, no focal infection, but a hypertrophied left ventricle with a systolic pressure of 230 mm. Hg. Here, too, a striking feature of the case was the prompt relief given by nitroglycerin, which uniformly cut the attacks short.

The more carefully we study these cases, however, the more frequently do we find that they are not due to arteriosclerosis or hypertension at all, but that the cause is a focal infection somewhere. In young people, with no organic ear or brain disease, the appearance of a serious vertigo at once suggests the search for some focal infection. This should, however, be not less the case in older individuals, with arteriosclerosis or hypertension, in whom these disorders may be supposed to furnish us with an adequate cause for the giddiness. Here, too, the more careful our search for a focal infection, the more often we shall find one, and, by relieving it, cure this distressing manifestation. Usually the symptomatology is perfectly definite—a sudden onset with nausea and vomiting, a sen-

sation as though surrounding objects were whirling in a definite plane, and marked accentuation of the vertigo in certain positions or with certain movements of the head. The duration of these attacks is usually brief, lasting from a few hours to a few days. They show a marked tendency to recur without obvious provocation. From the otoneurologic point of view they fall into two groups—those who, when tested during the interval between attacks, show a normal labyrinth and those that show a chronic labyrinthitis. The former are probably earlier or milder cases, in whom no organic labyrinthine change has as yet taken place. One of the most striking cases of this kind that I have seen is the following:

Mr. P., aged 68 years, who was referred to me in October, 1916, for vertigo. He gave a bad family history, his mother having died insane and his brother of delirium tremens. He himself was an alcoholic, gave an uncertain history of syphilis, and had for some years noted an increasing deafness in the left ear. For over a year he had had violent paroxysms of vertigo with vomiting. These attacks came on sometimes two or three times monthly, and were separated by intervals of complete well-being. They sometimes came on after a sudden movement, but not infrequently awakened him at night. Physical examination was negative, except for tortuous and calcareous arteries and an enlarged liver. He had lost almost all of his teeth except for a few old snags, and there was extreme *fetor ex ore*. There seemed to be several possible causes of his vertigo, one of them the arteriosclerosis. Nitroglycerin, however, gave him no relief. Another possible cause was suggested by the deafness in one ear. Fortunately, he consented to an otoneurologic examination, which was carefully done by Dr. Guggenheim. He found spontaneous nystagmus to the left, no nystagmus on douching the ears, and little or no past-pointing on rotating the patient with head erect; somewhat better with the head thrown back. His diagnosis was a toxic labyrinthitis due to a focal infection. X-ray films of the remaining teeth showed apical abscesses and the teeth were consequently removed. There were two attacks of vertigo during the following week, but none thereafter. I have heard from him several times during the past two years; there has been no recurrence of the vertigo.

Mr. M. also presented a complex picture. He had for some years been under the care of Dr. W. E. Fischel. He had long had an enlarged liver of doubtful origin and a chronic interstitial nephritis. Later evidence of duodenal ulcer, confirmed by radioscopic examination, had developed. Repeated Wassermanns had been negative. For some three or four years he had been dizzy occasionally, but had no serious attack of vertigo until November, 1917. Then, on arising from bed, he had a violent paroxysm of vertigo; surround-

ing objects appeared to whirl about him and he vomited profusely. At the same time his hearing appeared to be seriously impaired. The attack lasted for some hours. A week later he had a similar attack. After the attack, in each case, the blood pressure was about 200 mm., though ordinarily it had been in the neighborhood of 150 mm. I referred him to Dr. Louis Guggenheim, whose report in part was as follows:

The tonsils are negative. The neurotologic tests show no abnormality in the intracranial pathways of the vestibular nerves. The abnormalities noted are subnormal nystagmus after turning and subnormal nystagmus after douching both ears. The ears both show an involvement of both cochlear and vestibular divisions. It is possible that this change in the ears is a part of a general cardiovascular condition. It is possible that there is a certain amount of senile change in the labyrinths, but this we do not expect ordinarily at the age of 62. Certainly the violent attacks of vertigo accompanied by simultaneous impairment in hearing suggest the possibility of the labyrinths being flooded with toxic material of some kind. As you will have noted above, I found no source of toxic absorption in the nose or throat, and would suggest that you have Dr. Thorpe give you his opinion as to the dental condition of the patient, as Dr. Thorpe diagnosed pyorrhea sometime in the past.

Dr. Thorpe found the lower left bicuspid loose and had it drawn. The roots were found badly infected. Since then, and that was nearly a year ago, the patient has had no vertigo or giddiness of any kind.

The tonsils are also not infrequently the cause of toxic labyrinthine vertigo.

Mr. C., aged 75 years, has marked arterial sclerosis and diabetes mellitus. In the fall of 1918 a vertigo set in which made him an invalid, so that he dared not go out alone or without a cane. Dr. Guggenheim, to whom he was referred, found evidence of a toxic labyrinthitis, and the search for a focus was rewarded by finding a pair of infected tonsils, although the patient was not conscious of any tonsillar discomfort. His age and general condition forbade tonsillectomy, but treatment of the tonsils has resulted in a gradual disappearance of the vertigo.

Mrs. G., aged 43 years, summoned me last June for an acute attack of vertigo. She gave a history of asthma, with two slight hemoptyses twelve years ago. Two days before I saw her she had noted a buzzing in her ears, with some high-pitched ringing and a sense of fullness in the middle ear. On trying to arise in the morning she found herself very dizzy, especially on moving her head from side to side. There was no nausea or vomiting. Physical examination was negative, except for spontaneous nystagmus, large, ragged tonsils, and a blood pressure of 170 to 100 mm. Hg. Nitro-

glycerin failed to remove the vertigo, which persisted to an annoying, but not disabling, degree. A Bárány examination by Dr. Loeb gave evidence of a bilateral labyrinthine involvement, possibly due to the infected tonsils. The latter were removed, with prompt relief of the vertigo, which has not since returned.

Cases like the above bring home to one the importance of searching for a focal infection in all cases in which a vertigo is clearly not due to an aural or intracranial lesion. If we do so, other causes of vertigo will appear to become relatively less frequent, even though they may not disappear altogether.

SPINAL SYMPTOMS IN PYELITIS.

By HAROLD W. DANA, Major M.C., U.S.A., Boston, Mass.

Two years or more ago I saw a patient in whose condition the presence of a pyelitis was overlooked for several days by the dominance of an apparent cerebrospinal meningitis. Since then I have been searching for similar cases. While it is not probable that the condition is a common one, I think that it would fairly frequently be found if stiffness and rigidity of the neck were to be sought for in every case of pyelitis. In most of the cases in which a pyelitis gave an increased irritability of the spinal cord there was a simple tenderness, with slight or moderate rigidity of the neck, but there is sometimes, however, a more or less definite Kernig's sign. The presence of a Babinski reaction has not been found in the cases here reported. It seems very likely that the neck signs, which in my experience seem to be rather transient, would be found more often if sought for daily in each patient. In hospital, however, we have not by any means found signs of spinal irritation in every case of pyelitis, even in patients examined daily for such signs.

It is difficult to account for the occurrence of such signs suggesting a meningitis, apparently caused by a pyelitis. Possibly it may be due to a simple reflex; possibly there is some pressure from an infected kidney upon the spinal column which makes the spinal cord sensitive to stretching; more likely, perhaps, there may be a more or less marked extension of the disease process to the perirenal structures, with a slight or even fairly marked inflammation of the meninges.

On the other hand, how shall one explain a very similar condition, which I have noted in a case, which does not seem to be particularly unusual—namely, the presence of an actual meningitis in lobar pneumonia, and which it seems desirable to treat, as in other cases of meningitis, by the use of repeated lumbar punctures, as recorded recently by Musser and Hufford.[1]

In these pyelitis cases, as presumably in the pneumonia cases, since the cultures from the spinal fluid are ordinarily sterile, are we dealing with a definite serous meningitis? Certainly, if we have a case in which the spinal fluid is expelled under pressure, we must assume a condition of an actual inflammation of some sort in the meninges.

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[1]Musser, John H., Jr., and Hufford, Henry K. B.: Lumbar Puncture for the Relief of Delirium in Lobar Pneumonia (Jour. Am. Med. Assn., LXVIII, No. 17, p. 1231, April 28, 1917).

Additional evidence as to the probability of the last hypothesis would seem to be given by the case of the patient mentioned above (Case I). This boy, when first seen, had a definite stiffness and some retraction of the neck, with a slight Kernig sign, a history of headache and backache, a high temperature, the urine showing nothing at the time. He was sent to the hospital, where for several days the diagnosis of meningitis was not disproved. As a matter of fact, whatever may have been the definite etiology of the meningeal condition, it would seem plausible to insist that there was an actual "serous" meningitis, since the cell count made on the spinal fluid obtained by lumbar puncture was very considerably above the normal count of ten to twenty cells per cubic millimeter. It seems strange that a process, the seat of which is probably so low in the spinal canal, should manifest itself chiefly by a stiffness of the neck.

Some of the pyelitis histories are reported in detail, while the others had nothing of interest beyond the presence of meningeal irritation. One case (Case II) seemed to be of particular interest in that the patient entered hospital as a case of acute abdominal infection, was diagnosed as a perforated gastric or duodenal ulcer, he underwent operation for this supposed condition, and, in spite of extremely careful examination of all the viscera, no cause for his symptoms was found. When he came under my care he had a definite lobar pneumonia, and we felt that this was the cause of his condition. It is, of course, impossible to demonstrate whether the pneumonia was the primary condition, whether the process in his lung developed as the result of anesthesia, or whether, as now seems most probable, the primary process was the pyelitis, which later made itself manifest, and which had led both the surgeon and the medical man astray.

It has seemed to me that pyelitis was a difficult condition to diagnose in any case; that a good many cases of this disease go unrecognized, and that when we meet a sudden or an intercurrent febrile condition, with the signs of a severe infection, we ought to bear this possibility in mind more frequently than I, for one, have been in the habit of doing in the past.

If any proof were required as to the difficulty in some cases of making a diagnosis of pyelitis, Case II just referred to is surely to the point. This patient was diagnosed by his first medical attendant as an acute abdominal case, and by him sent to the Carney Hospital. Here, failing of finding accommodation because of lack of beds, he was considered to be suffering from acute intestinal obstruction, and set to the City Hospital, passing under the care of a clever surgeon before he came to me, and yet all of us failed to recognize the patient's primary condition until the day before he insisted on leaving the hospital. In this connection I may men-

tion that this patient did not have pus in his urine at every examination, nor was albumin reported present in each specimen. In such cases a daily examination of the urine would enable us *to avoid many errors.*

Why does a particular patient excrete different amounts of pus at different times? Has this absence of pus excretion at any given time any relationship to the occurrence of a chill? As I think of cases in the past having high fever of sudden onset, accompanied by a chill, no cause for which was ever found, I am strongly led to believe that some, if not all, of these represent other failures on my part to diagnose the presence of a pyelitis, and I suspect that the sudden flareup in symptoms might have been due to a pocketing or obstruction to the escape from the kidney of this pus. The case histories follow.

CASE I.

D. D., aged 10 years. (Seen in consultation with Dr. John T. Williams.)

Family History.—Father and mother living and well. No exposure to tuberculosis.

Past History.—Measles. Run over by a wagon four years ago, resulting in fractures.

Present Illness.—Duration, 40 hours. Onset was preceded by a cold lasting two days. Onset with vomiting. Later complained of much pain in left lower quadrant of abdomen; somewhat relieved by movement of bowels. Then began to have severe headache, followed by pain and rigidity of neck. Pain in abdomen prevented sleep last night. Anorexia. Constipated. No micturition day before yesterday; now two or three times a day; no nocturia. No convulsions. One week ago patient had headache and stiffness of neck.

Physical Condition.—Well developed and nourished. Conscious and rational. Considerable prostration. Complains of headache. Pupils equal and react to light and distance. Tongue moderately heavy brownish coat. Throat not red or swollen. Tonsils negative. Neck—moderate stiffness, but no retraction. Glands not enlarged. Heart—area of dullness 2 cm. to right and 7 cm. to left of median line; action regular, rapid, sounds clear, of good quality, no murmurs heard. Pulse—equal, regular, good volume and tension. Lungs—good respiration and resonance throughout; a few crackles heard at bases behind. Abdomen—rigid all over; spasm can be overcome to some extent, especially on right side; considerable general tenderness; more marked on left; right flank slightly dull, but tympanitic elsewhere; nothing made out on palpation because of spasm. Extremities—knee jerks present and equal; slight Kernig on right; no Babinski; no clonus. White blood count, 47,100. Temperature, 102°. Pulse, 128. Respiration, 30.

September 24. Spinal puncture gave 25 c.cm. of clear, colorless fluid under moderate pressure. Cell count, 70 per cubic mm., of which 90 percent are lymphocytes. Urine red, cloudy; specific gravity, 1,018; reaction, acid. Albumin, a large trace. Many leucocytes, few large round cells, red blood corpuscles, and coarse brown granular casts. Surgical consultant reports pyelitis or pyelonephrosis.

September 25. White blood count, 24,700; 26, 35,600; 27, 14,000; 29, 49,500; October 5, 12,800.

September 27. Temperature day after admission, normal; now elevated again. Patient vomited a good deal the first three days; yesterday and today retains food. Blood smear and differential count shows nothing. No plasmodia.

Patient ran a septic temperature of 98° to 100.5° daily for two weeks, then ran a daily average change of a degree for four weeks more (98° to 99°).

October 1. Neck still slightly stiff. Belly tender only on deep palpation; more so on left. Urine continues to show large amount of pus daily.

October 5. Staphylococcus culture from urine. Patient has occasional vomiting.

October 9. Surgeons advise expectant treatment. Abdomen as above; urine unchanged.

October 13. Belly still tender at deep palpation. Urine as before. No change until discharge on November 4, when urine still showed a trace of albumin, with much pus. General condition good, temperature above 99° each afternoon.

November 14. Severe attack of pain in abdomen, with spasm and tenderness over whole right flank. Operated on. Operation shows an acute hydronephrosis, with some pus formation. Pus evacuated. Patient left hospital December 20. In May, 1916, patient had another attack of pain in abdomen with temperature of 103° and pus in urine. At present, February, 1917, patient is still having occasional acute attacks of previous condition.

CASE II.

T. T., aged 35 years, married.

Surgical Record.—August 1, 1915. Temperature, 103.6°. Pulse, 120. Respiration, 32. Dictation by operator: "Patient came from Carney Hospital with diagnosis of acute intestinal obstruction. Not admitted there because of lack of beds. Does not seem to be a case of intestinal obstruction, but is apparently a case of gastric or duodenal ulcer. Man was taken suddenly ill yesterday morning while at work, with vomiting and extreme pain. Has not a board-like abdomen of perforation, but operation seems indicated. Too high a temperature for such early perforation."

Digest of Operation.—No free fluid or fibrin about stomach or duodenum. Stomach and duodenum thoroughly investigated and no sign of perforation found. No ulcer found. Gall bladder slightly distended, otherwise negative. Kidneys and ureters negative. Intestine negative. Appendix a small fibrous cord. No evidence of acute pancreatitis, liver abscess, typhoid fever, volvulus, or intestinal obstruction.

Temperature normal on August 7 and up to 103° on August 8.

August 2. Urine normal; reaction, acid; specific gravity, 1,023. Albumin, slight trace. No sugar. Much pus. Few round cells. On August 8 urine is normal; reaction, acid; specific gravity, 1,023. Albumin, slight trace. No sugar. No cells found in sediment. Seen by medical consultant on August 8, and transferred to medical service.

MEDICAL RECORD.

Family History.—August 9, 1915. Mother and father, wife and two children, three brothers and two sisters living and well.

Past History.—No previous illness. Wine, 1 or 2 glasses a day; beer, 1 or 2 glasses a day; no whisky.

Present Illness.—Ten days ago while at work was taken suddenly with pain in abdomen and vomiting. Since operation has been coughing considerably. Has some pain in the left chest.

Physical Condition.—Well developed and nourished. Conscious and rational. Slight cyanosis and dyspnea. Markedly prostrated. Profuse perspiration. Eyes—pupils equal, react to light and distance. Mouth—teeth fair; tongue thick white coat. Throat—slight general redness, no edema or exudate. Neck—no tenderness or rigidity. Lungs—right back from angle of scapula to the

base is dull with bronchial breathing and increased spoken and whispered voice; rare crackling rale; otherwise lungs negative. Heart—3 cm. to right and 10 cm. to left of median line; regular, rapid; good quality; pulmonic second sound increased; no murmurs. Abdomen—level, soft, tympanitic; from ensiform to umbilicus is a median fresh incision, with stitches still present; no tenderness or masses. Extremities, negative; knee jerks present.

August 9. Urine, normal; reaction, acid; specific gravity, 1,020. Albumin, slightest possible trace. No sugar. Few leucocytes. Rare coarse granular casts.

August 13. Urine normal; reaction, acid; specific gravity, 1,012. No albumin. No sugar. Many pus cells. Rare red blood corpuscles. Stitches removed yesterday; wound clean. Patient had chills while on surgical side, and has had one daily on August 9, 11, 12, and 13. Temperature rising to 104° and over, with actual rigor. White blood count, 13,000. Smear negative for malaria. Physical examination as before, but right base shows flatness and absent fremitis from midway between angle of scapula and base to the base. Prostration marked.

August 14. Brother insists on taking patient home.

CASE III.

S. A., aged 23 years, married.

Family History.—September 12, 1916. Unimportant.

Past History.—Measles and pertussis. Habits good.

Present Illness.—Pains over whole body. Admitted as typhoid. For two months patient has felt tired, dragged out, but has worked until five days ago. At this time complained of severe backache and general pains "throughout her bones." Next day had severe frontal headache. Vomited once, a day later. Pain through stomach; worse on eating. Burning and stinging pain on micturition. Nocturia. Urine never bloody. Vaginal discharge one year ago, lasting three months. Has lost some weight in past three months. Other symptoms lacking.

Physical Condition.—Well developed and nourished. No cyanosis or dyspnea. Conscious and rational. Eyes—pupils equal, react to light and distance. Ears and nose negative. Neck—no rigidity, tenderness, or glands. Lungs—vocal fremitus not increased; sounds normal, except for slight tendency toward bronchial type; whispered voice normal; no dullness. Heart—2.5 cm. to right and 11 cm. to left of median line; apex in fifth space just outside nipple line; action regular; faint systolic murmur at apex. Abdomen—no spasm, masses, or tenderness. Liver—just felt. Spleen—not enlarged; no rose spots; some tenderness in right flank. Extremities—no edema, scars, or swelling; knee jerks present and equal; no Babinski or Kernig. Temperature at entrance, 101°; on September 13, 103°. Pulse at entrance, 130; on September 13, 115. Respiration at entrance, 30; on September 13, 28. Widal negative. White blood count, 16,000.

September 14. Past two days there has been moderate tenderness and some rigidity of neck. Pain in back severe. Several chills, so patient states. Urine shows much pus in catheter specimen. Pyelitis considered probable diagnosis, in which gynecological service concurs. Transferred to gynecological service.

CASE IV.

M. S., aged 41 years, married, housewife.

Present Illness.—One week ago patient had pains in pelvis like labor pains. Passed some blood. Thinks she is five months pregnant. Took medicine to stop discharge. Next day was fixed up by a midwife. Ever since pain in both inguinal regions and shooting downward and inward. No difficulty with

micturition. Last child three years old. No miscarriages. Seven children living and well. One child died at three months; could not pass water.

Physical Condition.—Well developed and nourished. Conscious and rational. Head, eyes, nose, ears, mouth, negative. Neck—no rigidity, tenderness, or glands. Heart—sounds not accentuated; no thrill or murmurs; action regular. Lungs—good resonance and respiration. Abdomen—rounded, tympanitic, no masses or spasm. Tenderness over both costovertebral angles. Liver and spleen not felt. Extremities—no edema; no Kernig; knee jerks increased.

March 15. Temperature, pulse, and respiration normal. White blood count (3/14), 14,000. Hemoglobin, 80. Physical findings—slight rigidity and tenderness of neck, with suggestive double Kernig; marked costovertebral tenderness. Urine, normal; reaction, acid; specific gravity, 1,011. Albumin, trace. No sugar. Pus in sediment.

March 17. Urine, normal; reaction, acid; specific gravity, 1,007. Albumin, slightest possible trace. No sugar. Pus and squamous cells in sediment.

March 19. Urine, normal; reaction, acid; specific gravity, 1,009. Albumin, trace. No sugar. Pus. Temperature, pulse, and respiration normal. General condition somewhat improved. Costovertebral tenderness less marked, but patient's urine shows much pus. Patient went home against advice.

TORSION OF SPERMATIC CORD WITH UNDESCENDED TESTICLE SIMULATING STRANGULATED HERNIA.

By DR. MAX THOREK,

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Under the term strangulation of the testicle, or strangulation of the spermatic cord, a number of cases have been described in literature in which a mechanical torsion of the cord by interference with its vascularization has produced a sphacelous condition in itself or in the testicle, or both.

The first case of this kind was reported by Delasiauve in 1840, and was confounded with strangulated intestinal hernia, so that the condition, though not rare, is not common. About one-third of the recorded cases occurred in frankly undescended testicles, and some evidence of this condition was given in a large number of the other cases. Indeed, several authors consider that an abnormal descent or other anomaly of testicular development is a necessary condition for torsion of the cord or testicle. A true strangulation of the cord at the ring is hardly conceivable.

Torsion of the spermatic cord has been found to occur at all ages, but is most usual in the ten years following puberty. Vanverts,[1] who made an extensive report on the condition in 1904, collected 44 cases. In 39 of these in which the situation of the testicle was noted it was in the scrotum and normal in 17, in inguinal ectopia in 15, in abdominal ectopia in 1, and in the others either lately descended or irregular in the scrotum. Similarly in 34 cases of torsion collected by Lapointe[2] the testicle was nonectopic in 18.

The actual underlying cause producing torsion of the spermatic cord is unknown. As stated above, it is found that in about 47 percent of the cases the testicle is ectopic. According to Sebileau and Descomps,[3] torsion is especially favored by abnormal mobility of the testicle or by its abnormal pediculization. When the testicle is ectopic, there is usually abnormal mobility. The spermatic cord, being fixed to the abdominal wall by its superior pole, cannot well twist except by the action of the suspended testicle; and according to Bramann,[4] whenever there is any abnormality in the descent, there is more or less incomplete fixation of the testicle. Free testicular mobility is therefore looked on by many authors as a strong contributing factor of torsion. The torsion may occur either in the scrotal space within the fibrous sac or it may occur intravaginally. In the first the testicle and cord twist with the sac containing them; in the second, owing to some unusual condition of the vaginal, the

testicle floats freely and may twist within the sac. French writers distinguish between the two species, calling the first torsion and the second volvulus. Rigby and Howard[5] consider that the predisposing cause is a congenital abnormality in the attachment of the testis to the spermatic cord, joined to a voluminous condition of the tunica vaginalis.

There may be (1) abnormal attachment of the common mesentery and vessels to the lower pole of the body of the testis and the globus minor, so that the testicle is attached by a narrow stalk instead of by a broad band; (2) the globus minor may be elongated; or (3) there may be a capacious condition of the tunica vaginalis.

Scudder[6] found that in all reported cases of torsion with an undescended testicle the mesorchium was abnormally long. Bramann[4] found the same. Farr,[7] after an investigation of the literature, found (1) that there was usually a free-lying testis with abnormally long mesorchium; (2) that the relative size and position of the testis and epididymis varied greatly and both may be malformed or misshaped; (3) the tunica vaginalis is usually capacious; (4) cord is abnormally long or otherwise abnormal. As regards this latter, Lauenstein[8] has laid stress on a broad and flat condition of the cord, and Kocher[9] thinks that bifurcation of the cord favors torsion.

Trauma has been looked on as an immediate factor when the foregoing predisposing causes exist. In many of the recorded cases there is a history of straining or some other effort producing intra-abdominal pressure. Farr[7] thinks that torsion with an undescended testicle is largely due to intraabdominal pressure acting directly or indirectly on the cord and testis, an attempt of nature's perhaps to force a descent.

The natural result of torsion of the cord is to interfere with the vascular functions. The venous circulation is arrested, with consecutive congestion and intratesticular and intraepididymitic hemorrhage, which, according to the conditions, may lead to atrophy or necrosis of the organs. A suppurative or gangrenous condition can only arise if there be communication with some source of infection. The testicle becomes blackish from the gorged congested blood; histologic examination will disclose multiple hemorrhagic areas, with disappearance of all the distinctive cell characteristics of the seminiferous tubules.

The twist in the cord is generally confined to its lower part, and in the majority of cases it is from right to left in direction. In degree it may vary from half a turn to three or four complete turns.

The onset of symptoms is almost always sudden and severe, varying according to the degree of torsion; there is usually sharp pain in the inguinal region, with exquisite tenderness on pressure; if the testicle be undescended, there will be swelling in the groin above Poupart's ligament, and the testicle will be absent from the scrotum

on this side; the tumefaction has no impulse on coughing; the scrotal skin is usually red and edematous. When the testicle is in the scrotum, the latter organ is swollen and the appearance simulates epididymitis or orchitis. Vomiting is the rule, accompanied by persistent constipation, but suppression of flatus is exceptional. The intestinal symptoms are reflex in character, a reaction of the nervous system, resulting from torsion of nerves of the spermatic plexus. These intestinal conditions may occasion abdominal distention, with drawing up of the thighs, and the patient shows a facies abdominalis.

When the testicle is fully descended, the symptoms may be mistaken for those of epididymitis or orchitis, and diagnosis may be difficult unless the case is seen very early. Epididymitis, or orchitis, may usually be excluded, however, by the absence of any cause. Gonorrhea, prostatic trouble, mumps, and other infective conditions, syphilis, and tuberculosis can generally be excluded.

With an undescended testicle the symptoms are most easily mistaken for those of strangulated inguinal hernia. The symptoms in the two conditions are almost identical. In only a very few of this class of cases was a correct diagnosis made. In fact, in 57 cases of torsion collected by Dalous and Constantin[10] a clinical diagnosis was made in 3 only. As Rigby and Howard,[5] however, point out, the general symptoms of torsion, while similar, are not so severe as those of strangulated hernia, and there is not the same degree of shock. Vomiting is not so persistent and is never fecal; the bowels react to purgatives and there is rarely absence of flatus. Besides, the absence of the testicle from the scrotum will offer a clue; and Scudder[6] thinks that, with this fact known and the external abdominal ring empty, the mistake in diagnosis can hardly occur.

Vauverts[1] thinks that, while the two conditions can be differentiated by care, yet, if an epiploic strangulated hernia coexists with an ectopic testicle, differentiation from a torsion of the cord is impossible. It is interesting to mention that Villard and Souligoux[11] report that of 670 patients operated at the Lariboisiere, Paris, for inguinal hernia, 35 were cases of ectopic testicle.

Despite the apparent facility of distinguishing between a strangulated hernia and torsion of the cord with undescended testicle, yet in a large number of the cases, if not in the majority of the cases, recorded in which a diagnosis has been made preoperatively, cases of torsion with undescended testicle have been diagnosed as hernia. A tabular statement of such cases picked from the literature is appended.

With regard to the evolution of these cases and the treatment, Putzu[12] made a number of experimental torsions of the spermatic cord in dogs. He found that a double twist effectively cut off the circulation from the testicle and that the organ atrophied. In many

cases it necrosed and sloughed. Simpler torsion had results varying according to the amount of twist and the length of cord twisted. Atrophy may result, but the phenomena may be transitory. Of dogs that had suffered a double funicular twist, half had to be castrated. If operated within thirty hours of torsion, the testicle can generally be saved. In slighter twists the time can be extended.
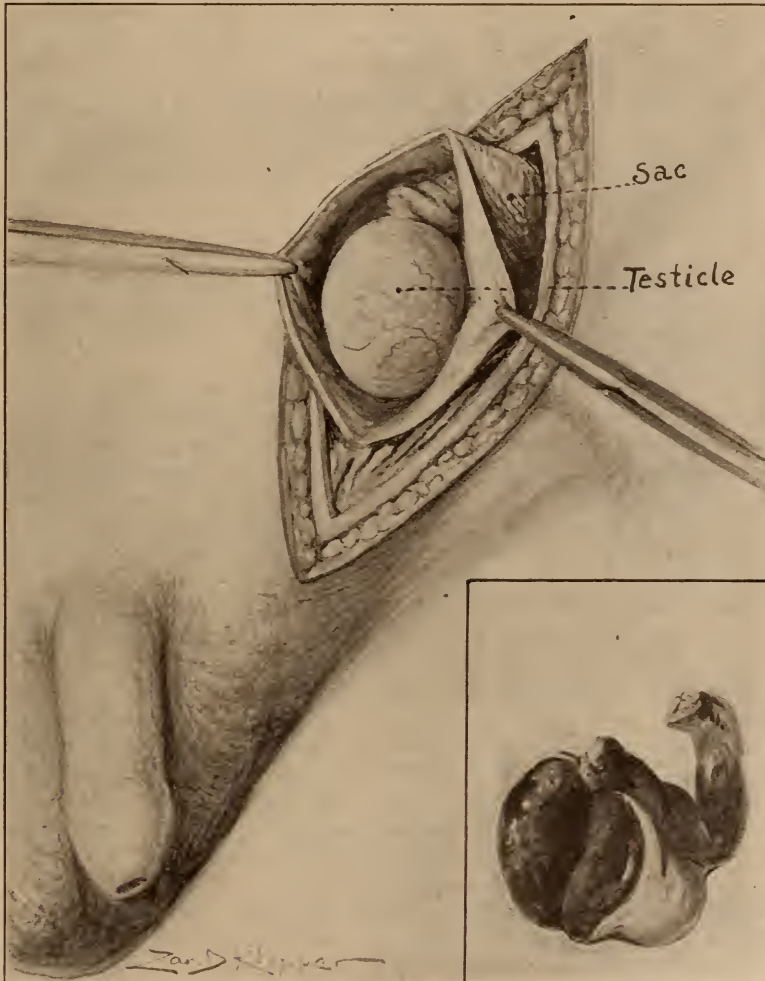
Author's case, showing point of torsion of the cord and anatomic relations. Lower illustration presents the gross appearance of testis and cord.

The clinical results observed and the operative findings generally agree with these results. Spontaneous detorsion may and often does occur, and is favored by rest, etc., but, as previously stated, the condition, if left untreated, may lead to hemorrhagic and ultimate gangrene. Atrophy is the more usual result, gangrene with sloughing being rare. In Scudder's list of cases there were 7 not operated; 2 of these atrophied and 3 sloughed; the results in the other cases

unknown. In 9 cases observed by Rigby and Howard they saw no case of sloughing in 4 unoperated.

The treatment of choice, if the case is seen early, appears to be to operate. If the testicle be undescended and in such a condition that its preservation may with confidence be expected, it should be drawn down and fixed in place; if fixation is difficult, or if the vascular process of degeneration gives little hope of a good result, castration ought to be the rule, as, even though atrophy might reasonably be expected, the dangers which might arise from possible infection suggest removal of the testicle and the tunica vaginalis, with the shutting off of the peritoneal cavity. Attempts made to suture the aberrant testicle in the scrotum have generally resulted in failure.[13][14]

AUTHOR'S CASE.

Andrew P., Polish, aged 15 years, 7 months. Referred by Dr. Edward C. Seufert. Admitted to hospital with diagnosis of strangulated hernia. Diagnosis corroborated by the writer.

Family History.—Negative.

Cinical History.—Patient has always been well and of very active type. Parents are living and have seven children besides patient.

Onset of Present Complaint.—While patient was lifting a basket filled with potatoes he perceived a sudden pain in the left groin, which became agonizing at once. He dropped the basket and fell on the floor. Two physicians were called in, who diagnosed the case as strangulated hernia, and the patient was ordered transferred to the hospital, which was not, however, done until the following day.

On his arrival at the hospital at 5 p. m. on the day following the onset the patient was found with a typical facies abdominalis, his left leg drawn up to his abdomen and strikingly shocked. He vomited only once or twice. His abdomen was tympanitic and somewhat sensitive. Over the left groin a swelling was found about the size of a hen's egg; the overlying integument was edematous and actively hyperemic. Gentle attempts at taxis promptly failed. There was no testicle in the left scrotum. Patient complained of violent pains, paroxysmal in character, radiating to the left thigh, abdomen, and perineum. The temperature was normal; pulse, 70; blood count, negative; bowel action, torpid; persistent efforts followed by expulsion of flatus and slight bowel movement; urinalysis, negative.

Operation.—Ether anesthesia. Incision over tumor. Tissues tumefied and infiltrated. Testicle exposed. Spermatic cord twisted once clear around at the lower angle, causing testicle to appear brownish black. The tunica vaginalis was free and very spacious. Considerable effusion of serous fluid into the vaginalis. Mesorchium was abnormally long. The cord was untwisted and packs wrung out of hot salt solution applied to testis and cord for nine minutes. No signs of return of circulation; no possibility, apparently, of bringing testicle into scrotum, as suggested by Bevan in performing operation for cryptorchidism. Testicle was then promptly removed. The wound was closed and the patient returned to bed. Uneventful convalescence and recovery.

Pathology.—On splitting the testicle and epididymis a brownish black color made it at once apparent that the venous circulation, as well as the arterial supply, had been seriously interfered with as a result of the shutting off of the blood supply by reason of the twisting of the cord. Here and there slight intratesticular hemorrhages were noted with the naked eye. The micro-

LIST OF CASES DIAGNOSED AS STRANGULATED HERNIA, OR IN WHICH THE SYMPTOMS
SUGGESTED IT AND IN WHICH TORSION OF THE SPERMATIC CORD WAS FOUND.

No. of case	Reporter and reference	Age of patient	Symptoms and diagnosis	Treatment and findings	Remarks
1	Delasiauve— Rev. med. franc et etrang, 1840, p. 363.		Strangulated hernia.	Efforts to reduce by taxis; then operated; testicle ectopic and cord twisted several times; testicle gangrenous and removed.	Recovery.
2	Scarenzio— Ann. univers. di medicina, 1859, p. 695.	41	Carried a truss for left hernia; sudden onset of pain in groin and signs of peritonization; inguinal tumefaction, strangulated hernia.	Operated; testicle ectopic in vaginal discolored; cord twisted twice; testicle edematous and full of dark blood; castration.	Recovery.
3	Anders— St. Petersb. med. Wchn-schr., 1892, p. 437.	13	Has carried a truss for hernia; tumefaction in the left inguinal canal; symptoms of strangulated hernia.	Operated; tumor found within external inguinal ring; pillars of ring sectional; tumor found to be twisted and sphacelous epididymis; reduced spontaneously; castration.	Recovery.
4	Bryant— Med.-chir. Trans., 1892, LXXV, p. 247.	15	Had undescended testicle; symptoms suggested strangulated hernia.	Operated; testicle in inguinal canal and discolored; cord twisted; untwisted easily; testicle was left in place.	Recovery; testicle atrophied; mentions that Math had a similar case in a young child.
5	Page— Lancet. Lond., 1892, I, p. 257.	17	Sudden violent testicular pains on right side and vomiting; tumefaction; constipation; strangulated hernia.	Operated; testicle black and sphacelous; epididymis tumefied; cord twice twisted from right to left; castration.	Recovery.
6	Barker— Lancet. Lond., 1893, I. 792.	15	Right testicle small and incompletely descended; right inguinal hernia for seven years; sudden pains in region; vomiting and high temperature; right testicle swollen; no stools for two days; epiploic hernia.	Operated; testicle flat, livid, and hard; cord twisted three half-turns; spontaneous detorsion; no hernia; castration.	Recovery.
7	Johnson— Ann. Surg., 1892, XVII, 282.	20	Had left inguinal hernia; sudden pain and tumor in the left scrotum; vomiting.	Operated three days after onset; testicle gangrenous; cord twisted several times; castration.	Recovery.
8	Lauenstein— Samml. klin. Vortr., 1894, No. 92.	25	Sudden violent pain in right hypogastric region during an effort; tumor in groin; right testicle absent; vomiting; torsion of cord or epiploic hernia or appendicular abscess.	Medical treatment, but patient grew worse; operated; testicle discolored; cord twisted 180° from right to left; detorsion; castration.	Recovery.

LIST OF CASES DIAGNOSED AS STRANGULATED HERNIA, OR IN WHICH THE SYMPTOMS SUGGESTED IT AND IN WHICH TORSION OF THE SPERMATIC CORD WAS FOUND.

No. of case	Reporter and reference	Age of patient	Symptoms and diagnosis	Treatment and findings	Remarks
9	Cohen—Deutsch. Zeitschr. f. Chir., 1890, XXX, p. 101.	21	Testicle ectopic in inguinal canal; sudden sharp pain in groin with tumefaction at site; thought to have strangulated hernia.	On operation murky red fluid found in sac; swollen black testis discovered; cord twisted; orchidectomy.	Recovery.
10	Whipple-Nash—Brit. Med. Jour., 1891, June 6, p. 1226.	16	Left testicle undescended; straining and felt something give way in groin; followed by lump in groin; vomiting; strangulated hernia.	Hour-glass swelling of scrotum and groin; lower half is testis, upper sac containing bloody fluid; epididymis strangulated; cord and epididymis twisted twice; orchidectomy.	Recovery.
11	Keen—Med.-Chir. Trans., Lond., 1892, LXXV, p. 253.	23	Had a right reducible inguinal hernia and an undescended right testis; pain, vomiting, tenderness and swelling in groin; thought the trouble was with the hernia.	Operated; orchidectomy; testicle had been rotated three half turns; hematoma behind testis partly gangrenous.	Recovery.
12	Dujon and Chegut—Arch. prov. de chir., Paris, 1900, VIX, p. 653.	14	After long horseriding, colic followed by swelling of left scrotum; pain ceased for some days, but swelling persisted; pains recur, with ballooning of abdomen; constipaion; symptoms become intensified; strangulated inguinal hernia.	Operated; testicle found black and cord twisted twice right and left; cord replaced with testicle (which was not ectopic).	Recovery, with progressive testicular atrophy.
13	Leonte—Bull. et mem. Soc. de chir. de Bucarest, 1900, p. 88 (see Bardesco, case 14).	70	Has always carried a truss for what was believed to be a left hernia and which at times had crises like strangulation; during one of such crises came to author.	Operated; cord found twisted 270° from left to right; castration.	Recovery; no gangrene.
14	Bardesco—Bull. et mem. Soc. de chir. de Bucarest, 1900, p. 89.	56	For four days showed the symptoms of right strangulated hernia, following a fall; no stools; no flatus; no vomiting; no testicular ectopia.	Operated; cord twisted 180° from right to left, commencing in intravaginal portion; castration.	Recovery.
15	Phocas—Mentioned by Vanverts, Ann. de mal. de org. genito-urin., 1904, XXII, p. 454 (case 43).	infant	Symptoms of strangulated hernia; testicle ectopic.	Operated; cord twisted; detorsion; castration.	Recovery.

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SUGGESTED IT AND IN WHICH TORSION OF THE SPERMATIC CORD WAS FOUND.

No. of case	Reporter and reference	Age of patient	Symptoms and diagnosis	Treatment and findings	Remarks
16	Defontaine— Arch. prov. de chir., Paris, 1894, III, p. 141.	8 mos.	Painful tumor in left scrotum extending to external ring; vomiting and agitation; epiplocele in a vaginoperitoneal sac.	Operated; cord twisted, testicle swollen; detorsion; testicle allowed to remain.	Recovery; testis atrophied five months later.
17	Pillet— Rev. gen. de chir. et de therap., Paris, 1911, XXV, p. 806.	32	Sudden pains in groin after heavy walk; tumor over inguinal region the size of orange; scrotum empty; one testicle ectopic; no stools; diagnosed as strangulated omental hernia in properitoneal sac.	Operated; sac contained edematous discolored testicle; cord twisted several times and sphacelous; castration.	Recovery.
18	McConnell— Dublin Jour. Med. Sc., 1912, CXXXIII, p. 337.	15	Sudden pains in right groin while sitting with crossed legs in tailor-like position; tumefaction and vomiting; family physician diagnosed hernia; hospital diagnosis strangulated inguinal hernia; right testicle not ectopic.	Operated; sac between pillars of external ring contained twisted spermatic cord and vas deferens; loop of cord twice twisted on self; right testis removed.	Recovery; author says the customary symptoms of twisted cord —viz., edematous testicle and redness of scrotum— were absent.
19	Farr— Ann. Surg., 1913, LVIII, p. 838.	1	Vomiting four days; constipation; pain and swelling in right groin; right testicle not felt in scrotum: strangulated right inguinal hernia.	Operated; inguinal canal contained enlarged testicle and epididymis twisted on cord; castration.	Recovery.
20	Turner— Brit. Med. Jour., 1903, II, p. 1403.	13 mos.	Sudden irreducible tumefaction in the left inguinal region; pain and agitation; no vomiting; testicle not found in scrotum; strangulated hernia with undescended testis.	Operated; testis in sac edematous and discolored; cord twisted one whole turn, right to left; castration.	Recovery.
21	Heaton— Brit. Med. Jour., 1905, II, p. 1342.	24	Symptoms both constitutional and local, closely resembled those of strangulated hernia.	Operated; testicle swollen and infiltrated with blood, discolored; tunica vaginalis distended with blood; castration.	Recovery.
22	Bruch— Bull. et mem. Soc. de chir. de Paris, 1908, XXXIV, p. 721.	18	Suddenly awakened from sleep by violent pain in inguinal region; came to hospital with diagnosis of strangulated inguinal hernia; bilious vomiting; diagnosis of hernia accepted.	Operated; testis and epididymis found in sac in inguinal canal; cord twisted; detorsion; castration.	Recovery.

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SUGGESTED IT AND IN WHICH TORSION OF THE SPERMATIC CORD WAS FOUND.

No. of case	Reporter and reference	Age of patient	Symptoms and diagnosis	Treatment and findings	Remarks
23	Viscontini— Gaz. de orped. e d. chir. Milan, 1913, XXXIV, p. 1041.	8 mos.	Vomiting, pain, agitation; scrotum enlarged on left; testicle in place; brought to hospital with diagnosis of left strangulated inguinal hernia; surgical diagnosis of strangulated epiplocele.	Operated; testis free in vaginal without mesorchium; vaginal distended; supravaginal twisting of cord from right to left; three times twisted; castration.	Recovery; author says that supravaginal torsion is very rare and that this is the fourth case on record.
24	Snyder— Jour. Kansas Med. Soc., 1916, XVI, p. 195.	13	Sudden pain without warning in left inguinal region; severe vomiting; shock; hospital diagnosis of strangulated omental hernia.	Operated; testicle in scrotum; cord twisted in vaginal; testicle gangrenous; castration.	Recovery; boy also had a simultaneous hernia in unea alba, which was rectified at the same time.

scope disclosed a distinct obliteration of the normal appearance of the semi-niferous tubules and a sanguineous exitus into the testicular tissue by diapedes and rhexis.

Conclusions.—(1) Torsion of the spermatic cord must be reckoned with as a possible criterion in the differential diagnosis of apparently complicated hernia; (2) from a study of the literature it becomes plainly evident that in twisted spermatic cords, particularly when they are ectopic with short mesorchium and with clear evidences of a beginning degeneration of the testicle involved, castration seems the only rational method of procedure.

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DIAGNOSIS IN PROBLEMS OF RECONSTRUCTION—ACCESSORY OR SUPPLEMENTAL THERAPEUTICS.

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The status of development is one of the chief objects of clinical scrutiny and exploration, and to appraise departures from the norm in type and makeup. This requires trained aptitudes like those of the expert in roentgenology—i. e., a familiarity with norms and variants from the norm, also keen appreciation of beginning, or obscure, abnormalities in structure, conformation, as well as of the more graphic functional peculiarities and errors.

This search should include alterations in muscular tonus, tonic spasms, also slight deformations, overtensions, contractures, tissue resistances, effects of reflex irritations, the presence of significant adhesions, limitations of mobility, rigidities, nodes, status of (tone and resistance in) dermal and subdermal structures, tendernesses on pressure, and whatsoever other morphologic anomalies exist. Among indicia should be appraised peculiarities of posture and attitude, those maladjustments due to anomalies of conformation and of attitude, faulty self-adjustment assumed instinctively or habitually, or in order to compensate or protect for some compelling reason—e. g., tenderness on pressure, transferred pains, and hence tonic spasm, inducing an attempt to get relief or protection capable of acting compensatory attitudes. Faulty or uneconomic postures or attitudes demand correction in the interests of functional competence.

One of the first purposes to achieve (objectives) is to place the subject, the impaired individual who is in a position of biomechanistic disadvantage, into an attitude of advantage. This being done, the next objective is to educate him or her how to appreciate and maintain the favorable state or attitude of superiority or self-controllability.

A position of advantage having been secured adequate to afford relief from obvious errors, the operator may then profitably proceed to search out every avenue of contributory causation and phenomena formation—chemical, secretory, diathetic, or other. The fact is, wherever we can amplify our means of approach in new and promising directions, they are worth considering.

<center>I.</center>

A sick or disordered or diseased human being is an aggregation of biochemical forces which have become perverted and require a particularized regulation. It is also a human mechanism out of gear demanding readjustment. To relieve the malady it is seldom enough to define just what, where, and how the major phenomena are and why manifested, and to administer suitable counsel or medication. The parts must be put into positions of advantage or of the least disadvantage.

Among the factors to be reckoned with are:

1. Anomalies of development, especially minor departures from the morphologic norm. These often induce or aggravate faulty habitudes, effects of disease processes, accident or errors in conduct, faulty attitudes or the like fortuitous happenings, which may thus become emphasized or exaggerated, and organic competence is impaired.

2. Anomalies of structure induced by neglect of right methods of living, especially those explainable on a basis of faulty biophysics, mechanistic errors in action, movement, posture (attitude), aggravating or encouraging disorders of mobility, elasticity, pliancy, tone, balance, poise, rhythm; also direct and indirect effects of over-effort, of exhaustion, of disuse or misuse by neglect of normal exercises, of adjustment, of motor discharge or excitation (motor stimulation), as well as functional confusions.

3. Abnormalities of structure arising from disordered or diseased states, and from traumata, from static conditions or of errors in metabolism, from effects of minor infectious processes, exerted upon gross structures and finer cell aggregations; also upon regulative mechanisms, upon ductless glands, sense organs, nerves, brain, and the like; of resistance effects, spasm, paresis, rigidities, densities, of obstructions, intestinal interferences, stasis, angulations, kinks; of sensory effects, of overexcitation upon sensorimotor mechanisms, of negative anesthesia or positive hyperesthesia, of pain direct or indirect, from origins immediate or remote, or from reflex complicated effects; also from effects of trauma, injury, of bruising, or of conditions of exhaustion, deprivation of food or water or air, of protracted exposure to elements, such as too much heat or cold, wetness or dryness.

4. Reflexes, their phenomena, susceptibilities, overaction or underaction, and their effects in solving clinical problems; reflexology, reflexodiagnosis; tonic muscle spasm, referred pains, their origin and manifestations; also aberrancies of reflex phenomena (responses).

Our therapeutic aims should therefore be directed to

(1) Raising the coefficient of energy, or the dynamic index, in an individual who is below par by reason of developmental or inherent

faults (hereditary hypoplasia), and environmental or acquired faults, such as slight or unclearly defined effects of disease or disorder whose chief influences are such as to emphasize developmental faults, latent weaknesses—in short, environmental hypoplasia. Reparative results are attained by constructive measures; and to

(2) Raising the coefficient of energy, or dynamic index, of an individual of presumably normal development who has suffered in one or more particulars from the effects of disorders or diseases capable of recognition, or at least appraisement—in short, of making full use of the resources of reconstruction.

The point of view we here take of the human organism is a biomechanistic one, approaching it from the standpoint of *the body as a biomechanism,* a vitalized, highly differentiated working unit compounded of body and spirit, a biologic grouping of biochemical and psychophysical or intellectual, or emotional (affective) agencies, but also of reflex or other manifestations exhibited as complex vitalized attributes.

II.

Man, the machine, readily falls into biomechanistic disarrangements in some particulars and respects more readily than does an insentient mechanism. His parts are semifluid, with varying degrees of structural qualities, flexibility, tension, relaxation, tone, spasm, contractibility, pliability, and of statics, or coming to rest. All this totality or *ensemble* makes for differences in function due to degrees of direct or collateral support, sufficient or insufficient, afforded by those delicate living structures immediately concerned in maintenance of poise, of structural and functional integrity.

The human being is a biologic unit; its several parts combine to make up that complex congeries of interrelated structures which usually need, sooner or later, skilled regulation. Nature supplies the impetus, the trends or tropisms, which proceed along wisely appointed avenues and channels through conscious and unconscious activities, instincts, habits, customs, and automatisms, and these can be depended on to carry one just so far, but yet not always all the way desired. These trends, forces, impulses meet with many encouragements at times, passing into liberties or licenses which demand restraint, modification, inhibition of their actions, or, on the other hand, need urgings, assistance, plus or minus energizings and comings to rest (equilibration). Likewise they (the forces in action) are subject to limitations, interferences, to disordering or destructive agencies capable of impairing the integrity of cells and thereby reducing them to exhaustion and ultimate inaction, inefficiency, disintegration or death. They also meet with opposition, environmental obstructions, and inhibitions partly from without and partly from within; some urgings arise through instinct, some

are acquired as habits, others are pathologic, some effects are credited to "the hand of God." As to control of trends and countertrends, there is need to learn what is best to be done or not done, and for guidance in conduct, behavior, emotion, and action; in conserving, in maintaining, in enhancing and elaborating force transmission.

The chief importance of all-over exploration is to bring to light accessory or correlated disorders. In my daily work there is constantly presented conditions of more than ordinary obscurity. At any rate, it is my custom to explore the body surfaces and structures with the view of learning much more than mere organic derangements. The individual makeup, type, conformation, peculiarities, deformations, anomalies of tone, of tension, of spasm, of rigidity or relaxation and the like, interest me more than most. Here we discover the secondary effects of injudicious or hurtful habits.

Thus becomes revealed oftentimes a need for surgical intervention which might otherwise escape detection. When such is the case, surgical counsel is sought. Then the question arises: is there required a cutting operation or can relief be afforded by manipulative procedures? Occasionally the surgeon admits that it is just as well to make the attempt before proceeding to so radical a measure. Frequently cutting is ultimately rendered unnecessary. Other clinicians are urged to do likewise. On other occasions obscure facts are thus revealed which lead me to oppose a positive opinion that cutting is needed; especially is this true when the patient shrinks from or declines operation.

Conditions are not seldom discovered which may be described as strictly surgical, or within the ambit of surgical exploration, or such as are commonly transferred to abdominal or orthopedic surgeons. Elsewhere are described the diagnostic and distinguishing methods pursued.

III.

A great and promising middle ground lies between medication and surgical operation, and that is reconstruction.

Many incidents or enigmas come under the field of observation, and entirely within the domain of any observing internist, but they escape recognition for the simple reason he omits the all-over exploration; he didn't look and touch. Should he trust more confidently to his powers of tactile apperception, he would often not only relieve a multitude of minor and some major disorders, but likewise the patient would escape the distress of mind as well as of body which cutting operations impose.

Let it be clearly understood that the surgical domain is not thereby invaded. More often than not surgical help is thus shown to be necessary, even imperative, which otherwise might be indefinitely

postponed. Indeed I have become so much gratified by this method of particularized exploration and surgical cooperation that I urgently recommend the practice or habit. Let me again refer to that mine of suggestiveness, Sir Berkeley Moynihan's book entitled "Pathology of the Living." Such revelations as his are now matters of common knowledge and modern procedure.

Among the morbid states thus observed are diverse disturbances of the abdominal organs, some merely functional and others morphologic, such as displacements of the viscera, disorders of tone, spasm, flatulence, painful distention and their causative factors, which militate so constantly against sleep, against nutritive and metabolic and psychogenic equilibrium. Among these are disorders of the genitourinary organs, notably those of the female and, more often than might be supposed, of the male. Such a one is prostatic trouble, which yields in my experience to manipulation and to carefully directed stretching movements.[1]

There might be mentioned in this connection morbid states of the urethra, routine examination of which is too often omitted. One need not assume that this viatum should be left wholly to specialists. The male urethra should be explored if for no other reason than the occurrence of extremely frequent psychogenic disturbances which arise almost solely through effects of strictures. So of a number of reflexopathies.

In my experience a vast multitude of lamenesses, deformations, joint troubles arise in nonsensory or nonpainful conditions of fibromyositis.[2]

Treatment of joint disturbances almost invariably should include attention to the periarticular and other associated structures as well as to the functional competence. A few moments devoted to exploratory mobilizing, to passive movements, to traction and torsion while the active process continues, however painful, will oftentimes lead to saving the function of full movements which would otherwise become seriously impaired or lost.

Very curious and often highly significant conditions are revealed by the combined results of visualization and tactualization. For example: A lady of middle age suffered a hemiplegia. In the process of exploration a soft boggy mass was revealed near the cecum, which disappeared after persistent colon irrigations, being a mass of years of feces, and the paralysis, to our astonishment, disappeared. This case occurred during my association with the late Weir Mitchell.

Another lady, who had run the gauntlet of the best experts,

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[1] See paper by author, Prostatism, Journal of Urology, Oct., 1917.
[2] See article on Fibromyositis offered to the Practitioner in November, 1918. I see no reason why internists should not become expert in assessing the status of many joint troubles or periarthritic impairments. After removing the focal origin, the joint too often remains ineffective unless judiciously treated from its origins.

showed obstruction of the gall duct, which yielded to experimental manipulation. She is today well, after the lapse of over twenty years. Both these ladies, by the way, were wives of physicians. Illustrative incidents could be multiplied indefinitely.

By no means omit to form the *habit* of searching the entire surface of the body, not omitting deeper palpations. Aside from the rewards in direct success, consider the zest of such a game of hide and seek!

IV.

DIAGNOSTIC SUGGESTIONS OR MEMORANDA.

In employing diagnosis from the standpoint of reconstruction (biokinetics or physicodynamics), it is desirable to become adept in familiar forms of investigation ordinarily used perfunctorily, or only to get a limited group of findings, and at the same time to search for certain other or heterologous phenomena.

Inspection.—One should become so familiar with normal gross anatomy, posture, attitude, proportion, symmetry, and the like, as to observe at a glance minor departures from the norm, anomalies in conformation, and to appraise causative factors, among which are effects of local tension or relaxation, spasm, contracture, rigidity, displacement, structural and vasomotor imbalance, stasis, angulation, and the like biomechanistic phenomena; also to become aware of normal or admissible variants.

Palpation.—Employing this term in its widest, most liberal interpretation of tactile perception or apperception, the use of the finger tips to "feel" of structures, superficial and deep; estimating degrees and kinds of tissue-tension, spasm, or relaxation, capabilities of action, passive and active mobility; of adhesions, densities, rigidities; of resistances or counteractions, and also relaxations; of degrees of sensitiveness, normal and abnormal; of dryness or moistness; of local temperature alterations, and the like; above all, of achieving an intuitive power or perceptive quality not definable, but rather a tactile *awareness* of something amiss in the framework, substance, or fabric, or reflexes, and what it probably indicates capable of being learned through kinesthetic or coanesthetic perceptions. It is a liberal education to watch a blind person explore a human face, lips, or surfaces.

One significant point is to learn how to determine degrees of irritation and their significance. Tenderness varies, and so does the degree of protective overtension (spasm), and what the source or point of origin is.

Pressures bring about varying responses. At one time they produce hypersensitiveness, which will lessen under suitable modifications of force and direction of tactualization. When continued for a minute or two, the tenderness usually lessens. Also, after an in-

terval of a few minutes, the attention being directed elsewhere, on resuming pressures the sensitiveness is found reduced by one-third or one-half. After two or three repetitions, with intervals, the sensitivenes may wholly disappear and along with it spasmodic states, and also other latent sensitivenesses, as in some correlated source of irritation.

There has been shown an excessive reflex effort, hence an exalted sensitiveness, inducing spasm; also the spasm induces compression on nerve or nerve terminals, which accounts for pain as well as deformation.

V.

Diagnostic Manipulation or Handling.—While seizing and testing tissues or parts by larger motions than by touch on surfaces may be regarded as part of "palpation," I submit that the art of tactualization is worth separate and careful consideration. By this imitation of, and indeed improvement on, the methods of the surgeon, a somewhat different group of phenomena are evaluated than the relatively crude seizings and fingerings ordinarily employed. The internist can thereby determine the significance of a multitude of phenomena within his domain, but of which he too seldom realizes the significance.

Some observations thus made are exact, and some safely inferential. To be sure, the internist does make use of some, a few, similar explorations, but not habitually, nor does he learn as much thereby as he might to his advantage. He needs to become aware of what he searches for, both what is normal and what is a normal variant as well as for an abnormality. It is to this diagnostic specialty I would direct attention and hope to show its value.

For example: Much will be revealed by imitating the surgeon in seizing the limbs, moving them about, determining degrees and directions of resistance, limitations of mobility, of pliancy caused by various agencies, among which are effects (besides traumata) of metabolic disorders, gout, rheumatism, fibromyositis; also "cramps" in intestines, spasm, meteorism, gases, flatulence, distention, or collapse.

Especially is this delicacy of touch, or tacto-facility, of use in searching out latent forms and degrees of that widely prevalent (and, to my mind, unappreciated) group of disorders known as fibromyositis. These are sometimes painful, or latently tender, at others nonsensitive or only sensitive occasionally, or only by cunning palpation, and hence of particularized definition, yet they are at all times more or less disabling.

Conditions revealed by these three avenues of approach will be found often of large significance as bearing on circulation not alone of the major, but especially of minor (lymphatic), cycles. As to the major circulation, so large a subject, we can merely allude

now to some points which need special emphasis in this connection —e. g., vagus, sympathetic and vasomotor tone, and also tone in the autonomic distribution.

In particular, attention should be focused on lymphatic propulsion, permeability, or stasis, and its bearing on nutrition of vital organs, nerves and nerve-sheaths, muscles and muscle-sheaths, attachments, fibrous structures, and multitudinous sources of irritation. These lymph interchanges cannot be relied on to proceed efficiently unless moderate and sufficient amounts of activities are pursued to elicit the pumping (*vis a fronte*) action of the great muscles, and hence especially those of the thorax and diaphragm and abdominal parietes.

The disorder presenting is to be estimated from observed effects, now existing in the individual, in the light of personal peculiarities (inherent or acquired), which may differ in kind and degree from others, as well as from causes differing in their effects on others. The subdermal conditions should be evaluated by lifting the skin in mass and noting adhesions, attachments, the flexibility or loss of flexibility, and also the degree of sensitiveness thus induced.

VI.

In short, a study is to be made of what kind of human mechanism is affected by the disorder; how he or she reacts to the biokinetic or mechanistic group of causal factors; rather than contenting ourselves with the more usual method of merely determining the clinical phenomena presenting, and applying remedies presumably capable of modifying the obvious or patent conditions found.

Moreover, there are obscure or unclear anomalies, often painful states, to be reckoned with in many diseases which complicate the plainer morbid manifestations, which are too often regarded as inevitable, and bound to disappear as the disease processes yield to natural powers for repair.

One element to be appraised by common sense consists in the nature, peculiarities, and abnormalities of the individual mechanism; whether—and, if so, where—it has undergone changes in shape, tone, balance; whether some parts are too loose or too tense; whether the fountains of force are rightly supplied, transmitted, transformed, or interfered with; whether parts are too rigid or too mobile, or in other respects out of adjustment or accommodation.

When so complex a mechanism as the human body is out of gear in one particular, it is a truism that other parts share in the disharmony, and that less obvious derangements become efficient factors in distress, disability, or even grave peril. When the organism is thus in disequilibrium, there is need for a master workman to readjust and redirect autoprotective forces, and this process may be called orthopedia or orthobiotics.

Roentgenodiagnosis and surgery have brought us a long step forward in knowledge of anomalies in function and of obscure disorders, especially of mechanistic or accommodative derangements. Surgery has shed much light by direct touch and sight where heretofore only inferences could be made.

These new and practical opportunities of learning things as they actually are have already revolutionized observation, carried knowledge to a point unbelievable a few years back. Not yet have internists availed themselves of these priceless tactualizations, also visualizations direct and mental, as they soon will do. The most thorough laboratory (biochemical) researches can reveal abnormalities only within a limited domain.

VII.

Graphic Illustrations of Diagnostic Findings Preliminary to Reconstructive Treatment.—The significance of tonic spasm as an evidence of reflex irritation in the more simple or less serious conditions, as of compensation when pain leads to the taking on of function, has long seemed to me of importance. An illustration of this is the familiar phenomenon of a group of muscles taking on increased and protracted function to relieve a pain in the hip, the shoulder, the neck or the like muscle groups. Thus spasm occurs in a correlated muscle group, inducing first fatigue, then aching or pain, later exhaustion, and finally transference or substitution to another third group, where the same sensory phenomena are repeated.

This I have pointed out in connection with sacroiliac disease. and also in many mild traumata or disorders. An interesting point made and verified by E. C. Lee, with whom I collaborated, is that pain is felt in only one of these areas (the last one) at a time; in the others—the former seats of pain—it sinks below the threshold of consciousness. When the last pain is relieved, as by suitable relaxation, the pain lights up in the second area, and, on this being relieved, finally in the first area affected.

A vast variety of sensory disturbances are caused by fibromyositis. I am inclined to the opinion that the phenomenon of fibromyositis is the chief, often the sole, pathologic state induced by many forms of irritation or inflammation. At least I find this so often that the conclusion is a strong probability.

Some form of tonic spasm frequently coexists. Densities are common, which disappear on expert manipulation of a kind which is commonly followed by relaxation of structures, and hence of spasm. Both the morphologic change and hypersensitiveness then disappear.

Rigidity of muscles (spasm) as an evidence of local irritation from tuberculosis has been pointed out by the brilliant observations of F. M. Pottinger in 1909, and later in his treatise on Clinical

Tuberculosis, 1917. I can only refer to this subject here; it deserves attention by all clinicians, since the phenomenon may be observed not only in this connection, but in many others.

Clearly education in tactile apperception is demanded of anyone who would do full duty in diagnosis. That it becomes an important feature in diagnosis must be admitted, not only as an adjuvant, but perhaps of first significance. In examining the chest we endeavor to determine the physical changes (alterations in biophysics). These changes are made evident to us through our senses of sight, touch, and hearing, and are determined by inspection, palpation, percussion, and auscultation. They manifest themselves not only in alterations of the pulmonary tissues, but in changes of the soft tissues covering the chest muscles and in the bony thorax itself.

Out attention has been centered too much on the changes in the tissue per se and not enough on the surrounding and associated structures. The elements which make up the sensation conveyed to the fingers on palpating or percussing the chest, and those which are conveyed to the ear on percussing and auscultating the chest, are several in number; the infiltration itself, the tissues surrounding it—pulmonary, cardiac, mediastinal, and pleural; the tissues covering the bony cage, and the cage itself. The tissues within the thorax are often influenced by changes which have resulted from previous or other present pathological conditions.

The reflex which affects the soft tissues covering the bony thorax in the presence of inflammation of the pulmonary tissue is produced in the same manner as that which affects the muscles of the abdomen when the abdominal viscera are inflamed. This reflex is best known in appendicitis, but is present in all inflammatory conditions affecting the internal viscera.

Could we but trace the reflex, I have no doubt that inflammation of every internal organ would be expressed on some portion of the surface of the body by motor, sensory, and, if it persists for a sufficient time, by trophic changes. The path of these reflexes is for the most part through the sympathetics to the cord.

The reflex is segmental in character. This point must be clearly understood, as otherwise the peculiar distribution of the reflex will not be appreciated. The meaning of this will be clear by recalling that a spinal nerve is made up of many individual fibers which take their origin from individual cells in the cord. The cells giving origin to the fibers which go to make up a nerve trunk may be distributed through more than one segment of the cord, but individual cells, when irritated, transmit their impulses only through fibers to which they give origin. It is not necessary that the entire nerve be involved in the reflex, as the stimulation may be confined to a few or it may involve many of its fibers. Only those fibers are

involved which take their origin from cells which lie adjacent to or receive irritation from other cells which give origin to fibers, particularly sympathetic fibers, which receive impulses from the viscera.

The two changes which interest us most from a diagnostic standpoint are the motor and trophic. The degree of contraction (spasm) differs according to the extent and activity of the lesion, because the wider the area of inflammation the greater the number of sympathetic fibers and the greater the number of cells in the cord that are irritated; and, the more active the inflammation, the greater the degree of irritation. Should this process go on to a chronic state or one which finally heals, then the trophic changes show themselves in a wasting of the soft parts. The skin, subcutaneous tissue, and muscles which are in the area or ambit of the reflex, degenerate, and show this change by a thinning of the skin, subcutaneous tissue, and muscles which are in the area of a wasting of the muscle substance. Should the activity continue, or should it again appear, the process has become chronic, then the muscles, degenerated because of the chronic process, would also show an attempt at contraction (spasm) because of the renewed inflammation.

VIII.

Psychogenic Significances in Diagnosis.—The mind shares with the body states in all mutations, variations, due to time and circumstance. A question not yet settled is whether mental processes, dominant as they are, can modify degenerative processes. They undoubtedly contribute to the good effects.

Can the neurones decay, the cells of the cortex die, without limiting the normal manifestations of thought power? It may be that compensations can be effected, other areas of the brain being called on to supplement the weakened portions. Some parts even in degenerative conditions must be, and remain, normal, or there is an end of the outgoings of force, direction, and control.

Sufficient material causes for serious or destructive mutations are, among others, long protracted metabolic disorders, traumata, or syphilis, or tuberculosis, or rickets. The coexistence of these must confute the assumption of the sufficiency of the mental origin of any ailment.

A necessary preparation for giving way of the defenses is some momentary mental relaxation or weakness. This may be brought about, or certainly aggravated, by exhaustion or protracted and severe anxieties. Mechanical factors are also forceful in and by themselves. The biokinesodic factors, the transmission of motor impulses through the nerves, must also be reckoned with.

Trauma, insult, sudden subversion of environmental equilibrium, reverse currents, less or more open the doors of defense to assaults

of toxins and of depressive agencies. By means of powerful stimuli —thermal, mechanical, chemical, manual, medicinal, and the like— are electrotonic states of tissue converted into yet other electrotonic states. Explanation of the relationships of these mutations deserve better attention.

By motivation it is possible to induce phenomena in nerve forces which closely parallel electrotonic states. Volition can also exhibit control over motor tracts, direct or contributory. How far beyond the motor filaments can the psyche reach?

Any change in any part of the body is capable of altering the balance of the whole; hence all willful influences can alter cellular equipoise. Can these volitional variants constitute a chain of influences which are capable of controlling health? In practice it is safe to assume that they contribute much to functional ease and economies, but cannot *per se* accomplish more. Here we enter a realm of great significance in all clinical problems. To ignore the possibilities thus opened up would be to fail in our duties. The evidence points strongly to the conclusion that by eliciting the forces of hope, of expectation, of confident and clarified volition, we add conspicuously to our resources, but there their power ends.

IX.

Diagnosis by Expression, Posture, Attitude, Gait, and other Visible Anomalies.—The appraisement of objective phenomena, normal and abnormal, through externals, such as of expression, appearance, revealed by inspection, is one of the chief domains of symptomatology in conditions capable of benefit through reconstructive procedures.

Master clinicians have, since earliest times, attributed much significance to visible peculiarities as guides to abnormalities. To recognize the norm is also just as important as the abnorm in order to draw contrasts. As other and more subtle means of learning essential facts became developed, less attention was paid to the gross phenomena. This omission of shrewd observations contributes to a lasting hurt to skillfulness and a loss of important findings.

A reawakening of interest is being exhibited in expression as a source of diagnostic and prognostic awareness. Small notice seems taken of this subject is the opinion of the author of a forthcoming book on "Practical Podiatry."[3] The author remarks: "It is strange how little attention this important subject has received from the profession." Judged from the paucity of current literature extant, this statement would seem justified. In many text books, however, excellent material is to be found. Doubtless close observers do make

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[3] Paul Luttinger in an advance article entitled "Locomotion," New York Med. Jour., Nov. 21, 1918.

diagnostic use of appearance, dress, mien, movements, attitude, gait, station, and the like.

Among the heritage of particular value from my long association with the late Weir Mitchell is a careful training in this form of discernment and differentiation. Since, first and last, several hundred promising young physicians acted as his clinical assistants, some of whom became distinguished neurologists, this knowledge and habit must have been thus widely distributed.

The nature of the evidence from sources indicated above is so varied it may be well to first merely sketch a few of the indicia as a series of memoranda and later describe briefly some of the more significant phenomena. (These will be found elaborated in certain text-books). From them we may adopt such hints as shall serve our immediate purpose. Indeed anyone, professional or layman, who has a taste for or has been carefully trained in acute observation will habitually note many features, ostensibilities, shapes, attitudes, colors, also demeanor, conformation, movements, and other differences from the standard or conventional. It is interesting in this connection to recall the minute schooling in observation and interpretation to which "Kim" was subjected in Rudyard Kipling's fascinating portrayal of the Eurasian waif, designed to fit him to become an instrument in the Indian secret service.[4]

For the needs of reconstruction it is desirable to get a pretty comprehensive idea of the creature as originally constituted, and what changes have occurred in makeup which need repair or restitution; also what prospects can be counted on for immediate and future reconstruction of both body and mind.

Here, in addition to a penetrating intelligence, one must have a good working knowledge of practical norms—a subject in which the medical student is too often sadly deficient. For this purpose there must be had, and quite above any scholastic equipment in medical knowledge, a large familiarity with facts gleaned in outpatient clinics and, if possible, as hospital intern.

X.

Indications from General Appearances.—Many points are so obvious, one is often able to make a pretty fair, though tentative, diagnosis from a casual survey. When doing so I find it important to criticise and revise my own impressions, and sternly decline to be swayed by wishful thoughts. It is much the best plan to assemble the findings and postpone forming conclusions until the evidence is all in, and this includes not only inspection, but palpation.

[4]Indeed, reading this episode greatly strengthened my conviction that minuteness of attention to appearances should be a part of education for every child. "Eyes and no Eyes" is an old classic worthy of rereading. The child of the streets, the "gutter snipe" men or women who are compelled to live by their wits, learn to note and interpret the acts, purposes, and aims of others and, in order to survive, of necessity put forth all powers possible in this game of bluff, the first move of which is to know much from a glance, to anticipate action, purpose, and capacity.

Diagnosis by Viewing the Body as a Whole.—First in the ordinary day clothes, next partly removed, and later when stripped for complete inspection and palpation. The passive insignia, and later the more active, will be considered.

A critical survey of a patient in ordinary clothing will reveal many signs helpful in forming quick judgments; some will require careful revision after being undressed. The superficial indicia deserve attention always for as much as they may be worth; perhaps they are all the physicians can get. It is always wise to insist on more complete examination, or later many omissions and some mistakes will be made.

Briefly, in the first survey there can be noted the care bestowed on the person or the neglect; the effects of good or bad habits, of self-respect or apathy, of good self-control or defectiveness, of mental poise or confusion states, of posture or attitudes, of symmetry or deformation indicating weaknesses or faults of structure, of chest competence or incompetence, of proportions or disproportions, of tone of structures or relaxation, of development or deficiencies, of stoutness or emaciation, of excess size or relaxation of belly walls, of local or general edema, and many other indications for improvement or change.

The clothing may conceal much, but the shoes will tell many facts. Feet may be occasionally normal, but far more often they are deformed by bad shoeing, causing corns or bunions; or the arches may be weak or flat, the ankles fallen in or out, the toes turned in or outward, how the sole or heel is worn in places, and many other evidences of defect. Conformation, the general makeup, proportion; symmetry or asymmetry, adjustment or disarray, vigor or weakness, and the like testimony to the status of latent energies, any or all are capable of being appraised by a shrewd survey in full clothing.

On removing the outer garments, much more is revealed; that which has been enumerated and other significances, also degrees and qualities not yet noted, in greater detail and precision. Here the proportion between the upper and lower half of the body, the shape of parts, their proportion, relaxation of parts, as of ligaments, tendons, joints, and muscles, not only of the trunk and limbs, but of the chest, belly, the tone of the thoracic, the erector spinæ, but also of the external abdominal muscles; the proportion of thigh to leg, of shoulder to upper or to lower arm, signifies much; so of the size and shape of joints in relation to bone, of bones to flesh, of the joint structures as revealing disease, arthritism, recent or old, of swelling or long organized structures due to metabolic diseases, gout, rheumatism, and the like.

Only those observers can fairly estimate conformation who are qualified to draw deductions from much experience in surveying

critically young and vigorous persons, athletes, troops, actors, poseurs, exhibitionists, men or women in masses—in short, those whose special tastes have led them to habitually note the norm and the adnorm, contrasts, peculiarities.

As to *conformation,* there are two marked congenital types of body, the "race horse" and the "percheron," the graminiverous and the carnivorous, those of willowy, slender, flexible structures, with long intestines, the vegetable feeders, and those with shorter bones, of straighter, more rigid backbone, deep chest, ruddy colored, with shorter, wider guts like the meat feeders. The contrasted constitutional features are described more at length under "types of men."

When the clothing is fully removed, the details of findings normal and abnormal by inspection, and also by palpation, are elaborated elsewhere, and can be only mentioned here.

Active Insignia.—Turning now to the more active phenomena, or features depending on action, we reach a group of symptoms which get less attention than they deserve.

First of posture, or positions of parts compatible with normal or original conformation. This is to be distinguished from the attitude (or modified posture) assumed by the individual for some reason, good or bad, that is economic or compensatory, or assumed to conform to whim or fashion. The posture depends on the original makeup, conformation, type, whether of the carnivorous or graminiverous, or dividing those again into the vigorous, energetic, forcefully endowed individuals, or the weaklings, and these again into the well or the ill, those who have long enjoyed vigorous health or whose structures have long been depreciated.

Attitude in lying depends much on the degree of vigor or weakness, on pain or on spasm (which is an important ground for changes in attitude), or on local damage, injury, or inflammation or joint defect, on rigidity or relaxation, or on distress due to circulatory or respiratory disturbances, or to local tenderness of gross structures, or to disorders of the internal organs.

Attitude Insignia.—There is the (a) dorsal strong or active attitude, lying comfortably on the back without constraint, seen in slight illness with no pain.

Or the (b) dorsal inert or passive attitude, lying on the back with the tendency to slip toward the foot of the bed, seen in conditions of marked weakness.

Or the (c) dorsal rigid, with legs contractured, seen in painful states, or one leg may be drawn up to relax tense abdominal muscles which compress tender structures.

Or the (d) side or lateral posture (decubitus), lying on one side in order to protect the other side, which is disordered or diseased, as when one lung is affected, as in pneumonia, pleurisy, which is assumed in order to free from constraint the acts of respiration,

or other parts—e. g., pressure on painful internal organs, or some injury or deformity. The side position, with legs drawn up to the trunk (the "coiled" attitude), is seen in acute diseases of the brain or meninges, in colics, renal or intestinal.

Or (e) opisthotonus, when the whole body is arched backward, resting on head and heels, is often seen in certain hysteroidal disorders or in strychnia poisoning, in tetanus and uremia.

Or (f) emprosthotonus, when the whole body is curved anteriorly, resting on face and knees, or toes, rarely seen, and is an evidence of profound disturbance due to somewhat similar conditions; this produces the opposite to opisthotonus. The prone attitude, face bored into the pillow, but with no tonic contraction of muscles, is occasionally assumed to get relief from abdominal, ophthalmic, or other pain in certain diseases of the backbone, and in gastric ulcer or mediastinal disease.

Or (g) orthopnea, a sitting bolt upright, seen in certain distressful states due to difficult breathing. The body may bend forward and be supported by the hands, making a tripod, or backward, resting on elbows. The sitting-up attitude, and fixing the elbows or arms and shoulders to reinforce the shoulder girdle and thoracic structures, is often assumed in asthmatic and obstructive diseases of the heart, in pericardial and pleural effusions, in abdominal dropsies, in compressions upon the diaphragm, and in paretic conditions of the upper air passages.

XI.

Expression of the Body as a Whole.—Shown by standing and walking, station, gait, locomotion. The power of standing normally on the feet is *station*. This includes attitude, the manner of standing, the power and relationships which the body bears (assumes) to the organism as a whole in the erect position, and also the carriage of the head and shoulders, the shape and quality of the parts.

Any departure from firm, graceful, economic postures or station is *sway*. This sway in the normal individual is a motion while erect, of about 1 inch forward and back and $\frac{3}{4}$ inch from side to side. This is to be estimated by watching the individual from the front and from the side, and measuring with the eye against some fixed object in the line of vision; or an instrument may be used.

The particular manner of progressing in the erect posture (walking) is *gait*. The total power and control of the acts of walking is the inclusive one, *locomotion*. Each person exhibits personal characteristics in the acts of standing and locomotion. When these characteristics vary beyond reasonable limits, they betray peculiarities in makeup of the organism as a whole (mind and body as a unit), which betokens structural departures from the norm. These alterations may be due to anomalies in conformation, inherent deformations, or to the effects of disorder, injury, or disease.

These graphic manifestations shown by attitude and locomotion are of value in not only appraising character and personality, but (for our special purpose) such evidences of deformation, injury, or disease as require repair through reconstructive measures.

In order to make good use of this type (or group) of evidences in diagnosis, the examiner must start, as has been said, from the standpoint of a fair familiarity with all ordinary norms, having due regard to age, previous and present conditions of life, habits, tastes, training, occupation, and also to such anomalous conditions as have occurred inducing departures from the structural norm.

Next it is necessary to become familiar with the appearances, (expression) the actions (movements) which may be due to original or long-existing deformations and to those acquired by habit, occupation, strains, injuries, bruises, subluxations, joint disorders, fractures, suppuration, and loss of structure, contractures of those which support the body as a whole, the muscles, internal and external ligaments, those of the backbone front and rear, injuries to those whereby, e. g., a muscle takes on the function of a ligament and ceases to be pliant, as in spasm, protective spasm, compensatory actions, and other losses of pliancy, mobility—e. g., fibromyositis; also diseases of the internal structures of the chest, lungs, heart, and great vessels—e. g., aneurism—whereby loss of tone induces alteration in the chest walls, also of the abdominal viscera, inflammatory or due to new growths, to intestinal stasis, adhesions, kinks, angulations, visceroptosis, and to edema. Also, there are to be appraised alterations of structure, direct and indirect, the primary and secondary causes to be considered and differentiated. Then there is that large and complex field of the socalled *nervous diseases* which can only be alluded to here.

Some nervous diseases are due not to organic changes in the nerves themselves; they arise from such causes as have been alluded to above, but are also complicated by psychogenic causes, psychopathies, bewilderments, "hysteria," oversuggestibility, the debatable realm of "functional nervous disease," wherein the part comes to dominate the whole reflexly, or, on the other hand, a bewildered mind (psychopathy) dominates the part and impairs action, expression, attitude, station, gait, and locomotion.

Diseases of the nervous system afford a rich group of peculiarities of bodily expression, including that of the face, figure, and movements. Three types of gait are recognized in which the impairment of motor control is due to different kinds of disability:

1. The paretic, loss of power due to partial paralysis or inability to energize, to turn on or off the lessened power at will.

2. The ataxic, in which disease of the posterior columns of the cord induces a characteristic form of loss of motor control, usually localized in the lower limbs.

3. The choreic, in which there is likewise a unique impairment of control which may extend to the whole body.

These three types of gaits are capable of a variety of subdivisions and groupings to describe the actions of sufferers from different nervous diseases. For our present purpose it will suffice to quote a part of the description given by Luttinger and to refer the reader to the original or the book, "Practical Podiatry."

XII.

Paretic Gait.—Paresis means a lessening of the normal motility of a muscle, while the term paralysis denotes entire absence of motor power. We may have, therefore, three distinct paretic gaits, according to whether the muscle is slightly or severely weakened or entirely paralyzed—A, the mild paretic gait; B, the moderate or flaccid paretic gait; C, the severe or spastic paretic gait.

A. The mild paretic gait.
    1. The pompous gait.
    2. The hobbling gait.
    3. The intermittent limping gait (may be classified here, and is a curious limping which develops in arteriosclerosis of the lower extremities).
    4. The waddling or goose gait.
    5. The wobbly gait.
    6. The tottering gait.
    7. The shuffling or "doddery" or slouching gait.

B. The moderate or flaccid paretic gait.
    1. The steppage gait.
    2. The prancing gait.

C. The severe or spastic paretic gait.
    1. The mowing or hemiplegic gait.
    2. The small step gait.
    3. The crosslegged gait.
    4. The ill-defined spastic gaits.
    5. The dragging gait.
    6. The dromedary gait.

Ataxic Gait.—A, *the static spinal ataxic gait.* There is an exaggeration of all the movements of locomotion. The hips are overflexed and rotated laterally, the foot is raised suddenly and too high, the toes are lifted, and the whole limb is thrown suddenly forward with unnecessary vehemence. The feet are kept wide apart, and while in the air they move in an undecided manner. In the cerebellar type of this gait the movement excursion is not as extensive as in the spinal type. In order to test static ataxia, the patient is made to stand heels and toes together, whereupon marked swaying takes place. The swaying is increased when the eyes are closed.

B, *the cerebellar* (*functional*) *ataxic gaits.* These gaits are produced by a disturbance of the equilibrium, accompanied by vertigo, resulting in a very irregular swaying from side to side, resembling the gait of an intoxicated person.

1. The titubating (staggering, reeling, or stumbling) gait is a form of functional cerebellar ataxic gait.

2. The reeling or staggering gait seen in acute alcoholic intoxication, in disease of the middle cerebellar lobe (Ménière's disease).

Choreic Gait.—The choreic, spasmodic, or hysterical gait consists of a series of quivering or trembling movements of varying intensity, but nearly all due to clonic spasm, and disappearing during sleep or passive motion. This distinguishes it from the spastic or paraplegic gait, in which spasm is tonic in quality. The clonic spasm, on the other hand, consists in rapidly alternating contractions and relaxation of the muscle.

1. The stumbling gait is seen in chorea. It resembles that of a schoolboy who clownishly stumbles or trips over his heels to attract attention. The patient appears restless, unsettled, and fidgety.

2. The festinating gait is typical of the disease known as paralysis agitans, and is an advanced choreic gait, in which there may be observed the curious phenomena of propulsion and retropulsion —i. e., the impossibility of stopping, once the patient is pushed either forward or backward.

3. The saltatory gait ("the jumpers") is probably due to an hysterical spasm.

4. The myotonia gait occurs in Thomsen's disease, and consists of tonic, painless spasms whenever a certain group of muscles begins to function.

5. The hysteric (simulative) gait, known also as astasia-abasia, is notable by the ease with which it may imitate or mimic any and all the gaits described above, the spastic as well as the flaccid types of paralyses, even the cross-legged gait, ending in complete inability to stand or walk. It differs from all of them, however, in the ability of the patient to perform all the nervous functions of the limb when lying in bed.

SOME THOUGHTS ON MEDICAL EDUCATION AFTER THE WAR.

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In a recent number of the *Princeton Alumni Weekly* there is a comment on an article by Wilson Farrand, which appeared in the October number of the *Educational Review*. It introduces its discussion with this statement: "It is hardly too much to say that 'the face of all the world' will have been changed by the war, and nothing has changed more than university life in the last two years. The changes which have taken place, and which must either be continued in effect or readjusted, fall under at least three heads."

The article referred to was called "Readjustments in Secondary Education." What was said about extra curricula activities and about vocational tendencies did not have much bearing on medical education, but a suggestion in regard to the third head which he gave as curriculum is worth our thought, and I shall quote one paragraph from the *Princeton Alumni Weekly*:

"The first of these strong tendencies he finds in a clearly marked movement to establish definite standards of work and of attainment. The necessity for some such uniformity was never more apparent in the colleges than when the Government called on some five hundred institutions to carry out a similar plan of military study and training, and the question is not infrequently raised in academic circles whether it would not be a good thing for education generally if the Government, through a ministry of education, such as exists in most European nations, took measures to establish some standard of achievement which would have to be met by all colleges before they should be allowed to confer the degree of A.B., B.S., Litt.B., or whatever else it may be."

This is a thought which should also include graduate education. Of course, it covers a wide range, and even encroaches on the subject of states' rights, but I am sure that many of us feel that something should be done in this direction, and, until the Government itself takes a hand, our associations and societies might give valuable aid. If it is of importance in "secondary education," it is certainly of vital importance in medical education, which has to do with the conservation of the health of the nation.

There are four points on which I will touch in this discussion—education of the masses, uniformity of requirement for all healers, established standards for the degree of M.D., and special requirements for those specializing.

After centuries of waste, great nations have awakened to the necessity for the conservation of their natural resources. Where this necessity has been realized, leaders have arisen to direct these

nations to proper methods of controlling the use of these resources and of lessening this waste. The leaders in this work have been men of learning, impelled by unselfish motives to take up the cudgel against greed and ignorance.

The human race has not only wasted the God-given resources of nature, but its ignorance and greed have led it to waste and neglect human life and health in general, and in particular the normal faculties and senses.

The ignorance that has led to this neglect is of two kinds—excusable ignorance, due to the limitations imposed by human frailties, and inexcusable ignorance, due to lack of general enlightenment on the facts we have gained in the progress thus far made. It is with these two kinds of ignorance that we must deal in order to see what may be done with the powers in hand, and what we may hope to gain by further advancement. While perfect knowledge is not attainable, we must ever increase knowledge, and push with vigor the fight against prejudice and ignorance.

That medical science has made great strides, and done much to conserve human life and health, is, I think, unquestioned by scientific men, and the arguments of those who decry the work done (as those who wage war against vaccination and the use of antitoxine in diphtheria, and those who are obstructing research work by belittling its results, and attempting to legislate against some of its forms) cannot be considered in any scientific discussion; neither does any great seat of learning or thought give them any serious recognition. It is perhaps a trite saying that medicine is not an exact science, but medicine is a complex subject, and among its component branches are sciences as exact as any, Of course, theory must play a large part in our present knowledge, in any science, and on this account differences of opinion arise.

Differences of opinion among men of learning tend to breed skepticism among the laity, but we can fight this skepticism by increasing our knowledge and supplanting theories with facts, and by spreading abroad those facts which are incontrovertible.

By teaching in our schools generally those branches of medicine which are exact, I believe that through the great force of education much can be accomplished toward overcoming ignorance and prejudice. There has been much talk lately of a campaign for education in the matter of sex hygiene, but there is some difference of opinion as to whether the school or the home is the place for such information to be imparted. There is room for such difference of opinion, and we must not move too hastily, but I believe that a good course in physiology should be a required part of all education. This should include some gross and microscopic anatomy, and might well be augmented by some elementary knowledge of pathology. Some practical suggestions for the application of such knowledge

as has been gained might be included in a course in hygiene. Such courses introduced at the proper time in a child's education, and elaborated in the higher grades, would be of unquestioned value, and sex hygiene, to a limited extent, might be tactfully included.

"A little learning is a dangerous thing." For that reason I believe that the subjects taught should be most carefully selected and of such nature as to suit the student's age and mentality.

In making the plea for some elementary training along these lines, I am not aiming to favor any school of medicine. There can be no cleavage along the lines of generally accepted facts. It would certainly be unwise to carry general instructions beyond these limits.

But as to schools of medicine, I would say there should be no schools of medicine. I might say there *are* no schools of medicine, for the science of medicine is essentially catholic and must use any legitimate means of therapy that will result in the benefit of the patient's health.

While I believe that such a wide dissemination of facts would go a long way toward combating the unscientific enemies of progress toward the conservation of our energies, I am sure that it is only a small part of the work to be done. In addition to this, the class of men who are to do the healing must be better trained. We must have men specially trained and with special knowledge; men who have drunk deep of that Pierian spring. By improved preparatory training and exacting medical schools and state board examinations a high standard must and will be required of our trained men. We must exact this if we are to place ourselves in their hands with confidence that they can help us. The knowledge that their training has been of such character as to fit them for the task in hand will certainly increase our faith.

As to the state requirements, there should be certain definite requirements for all who heal, whether they call themselves physician, homeopath, osteopath, or what not. Surely a man cannot lose by knowledge—anatomy, physiology, and chemistry are essentials. There is no homeopathic anatomy, no osteopathic physiology, or hydropathic chemistry. Even if some special knowledge in these branches is claimed by a socalled "School of Medicine," there would be all the more reasons that the fundamental facts of these sciences should be acquired. While the fundamentals should be required of all, it might be necessary to vary the examinations on therapeutics to suit the requirements of the cult with which the applicant wished to identify himself. I am inclined to believe, however, that if an equal period of preparation were required for all, and a reasonably exacting examination, the "schools" would be rapidly merged and quackery would disappear altogether.

Most of our states are demanding a high standard for our doctors, and all of our best schools are lengthenng their courses and raising

their entrance requirements, but the sects, or schools, of medicine that require little in the way of education are allowed to heal with a most limited knowledge of the organism that is affected. If we license and require much of our doctors, should we not require more than we do of the "healers?" If we license a wireman or an engineer, we require that he understand the mechanism of the machine with which he is to work. Isn't the human body the most important of all machines?

After all, what do the arguments against such requirements amount to—that the doctors are trying to form a trust? Do they ask any more of others than they ask of themselves? The ideal physician is always working in the interests of humanity, and selfishness and commercialism will decline as education increases.

The Christian Scientists claim that this would work a hardship on their healers; but why should they be allowed special privileges? They claim to be highly educated and intellectual, and, if so, could not be inimical to the highest educational requirements. The existence of matter is disclaimed by these people. Even though not admitted, they act on the supposition that certain actions are always followed by corresponding results. If one does not eat, he starves, and few are willing to thus test their faith.

Examples might be multiplied, but suffice it to say the faith that is weakened by learning should be abandoned. "Ye shall know the truth, and the truth shall make you free." We who are in darkness must seek the light. I insist that the fundamental requirement for advancement is education—education of the masses and education of the special classes.

Though the standards of medical education are high in most of our states, it would be well if there could be uniform requirements for the degree of M.D. throughout the whole nation. Such a ministry of education as Mr. Farrand suggests could establish standards and means of seeing that they are met. In the absence of such Federal control, some relationship between our state boards might be fostered.

In addition to the work that has been done in this connection, much remains to be done along the line of protecting our neighbor. The fact that a man himself is a nonbeliever in contagion, does not permit him to let his home go unplacarded or to continue sending his children to school to bear contagion to others. The isolation of contagious diseases in the light of our present knowledge is an important step in the conservation of health. Compulsory vaccination and antispitting ordinances are advancements that have been made, and largely through the means of education. The inspection of public school children is a move in the right direction, and is hampered and restricted from its full usefulness only by ignorance and prejudice. It is only through education that these things can be

appreciated, maintained, and gradually made more effective and extensive.

In an address before the Association of Colleges and Preparatory Schools of the Middle States and Maryland, Dr. Nicholas Murray Butler says: "The care and protection of public health will hereafter assume new importance. Preventive medicine, which has made great strides in recent years, is only at the beginning of its history. The physician and the nurse will shortly be looked on as educational factors quite as important as the teacher himself. Care of the public health will not content itself with the mere inspection of children and youth in school and college, or with the care and cure of definite diseases. It will establish a relationship between home conditions, school conditions, and work conditions. It will have helpful advice to give, both general and specific, as to diet and exercise, and it will insist that neither at home, in school, nor at work shall children and adolescent youth be subjected to conditions that impair their bodies as well as starve their souls."

To properly specialize, a man must build his special knowledge on the broad foundation of general medicine. The danger in specialization is narrowness, but this is no reason for abandoning the specialties. They must exist, and much of the great work thus far done and the advancement made has been due to those trained men who have specialized.

We have spoken of education of the masses, of a higher and more extensive training of the healers, of uniform requirements for the M.D. degree, and now we must go still further and demand the special training of socalled specialists. At present many physicians with poor general training from inferior schools will set themselves up as specialists, with practically no special training. Whether it would be practical for the state to require such special training is open to discussion, but, at any rate, much can be done by public opinion and by requirements in the medical schools and among the profession.

The need for a step in this direction has been felt, and recently many of our most prominent surgeons have formed a society to be called the American College of Surgery, modeled after the Royal College of Surgery of England. The object of this society is to raise the standard of surgery, to recognize surgical ability by conferring the degree of F.A.C.S. on those who possess requisite ability and fitness.

There is much work that such a society can do to raise standards, and it seems to me a step in the right direction, though it is in its incipiency. The public will be led to know of the existence of such a degree, and in years to come it may be as significant in this country as the F.R.C.S. is in the mother country.

Some additional recognition might be given to men specializing

along all lines, as special schools giving diplomas already exist. Such a certificate or diploma has, however, so far no real value. I believe that the regular profession ought to require some regular recognized special training for specialists, as a post-graduate course of a definite period. All specialties are taught, and rightly so, in our medical schools, and this training should be practical as well as theoretical, but it cannot be thorough enough to fully fit a man to be a trained specialist.

The necessity for special hospitals is now felt in all of our large cities, and, in connection with the clinics of these institutions, teaching of a post-graduate nature has become a feature. I believe that this custom should become more general and that the certificates or diplomas of these institutions should at least be a requirement of the specialist. Their value should be generally recognized.

CURRENT NOTES

Ohio State Medical Association.

, The Seventy-Second Annual Meeting of the Ohio State Medical Association is to be held in Columbus on Tuesday, Wednesday, and Thursday, May 6, 7, and 8, according to an announcement just issued by the State Council of the Association. The forthcoming convention is expected to be the largest in point of attendance and interest in the history of the Ohio state association. A number of committees are already at work in planning the program.

Among the interesting features which are being planned in connection with the exhibition will be the scientific exhibits by the State Department of Health, the Ohio Board of Administration, the Ohio School for the Blind, and the National Society for the Control of Cancer.

Space for the commercial exhibits will be allotted, beginning the first of March.

Nephritis in Children.

Schippers and De Lange state that examination of the urine of 1,000 children at the Children's Hospital at Amsterdam failed to show any dependable connection between the presence of formed elements, of albumin or of chondroitin, and the existence of nephritis in dubious cases. They occur with nephritis, but they may also occur in the healthy. On the other hand, functional tests of the kidneys generally reflect the functional capacity of these organs, and they may be relied on to clear up the diagnosis. The two tests applied in the research reported were the accommodation test and the metabolic findings on the Hedinger and Schlayer test diet. The findings with these two methods are tabulated for comparison, filling three pages, as recorded for, twenty-two children, ten with clinically normal kidneys and three each with orthostatic or atypical albuminuria, or convalescing from acute nephritis or with pedonephritis. The latter is Heubner's term for a benign inflammation of the kidney without phenomena on the part of the vessels, but with a small number of formed elements in the urine and albuminuria, often of an orthostatic type. These tests revealed that one case which seemed to be mere orthostatic albuminuria proved to be strongly suspicious of nephritis, as also two cases otherwise atypical albuminuria. The fluctuations found even in normal children warn, however, that the limit between health and disease·is not sharply defined: Some of the children listed as normal may yet prove to have incipient contracted kidney, explaining the wide range in their supposedly normal condition.

They list further the findings when 0.5 gm. potassium iodid was given to the children in a wafer with a little water. After the fortieth hour the urine was tested regularly for iodin. In the normal children all the drug had been eliminated by the forty-first hour, probably from the twenty-eighth to the thirty-eighth hours. With one child with nephritis the elimination dragged along to the forty-fourth hour, as also in a case of pedonephritis, and to the forty-second hour with an atypical albuminuria. In all the other children tested no traces of the drug could be found by the fortieth hour. With the accommodation test the subject drinks from 500 c.cm. to 1.5 liters water, and the glomerulus function is estimated by the time required for this mass of fluid to be eliminated. Adults may void 500 c.cm. or more at the first micturition,

and healthy kidneys eliminate the whole, and as a rule even a little more, within four hours. The specific gravity falls to 1.002 or 1.001. The diuresis afterward is much reduced, and the specific gravity then reaches 1.025 or 1.030. The children are kept on the usual standard diet for their age for several days. The urine is voided at 6 and at 7 a. m. Then the child drinks 300 c.cm. or more of water and nothing more is given to drink till 7 p. m. If it complains of thirst, it is given an apple. At 11 a. m., 1 and 4 p. m. it is given a test meal of bread and biscuits, with cake, jam, or cheese, but without butter, and at 7 p. m. it gets the usual food. The urine is collected separately at seven two-hour intervals, and the amount, specific gravity, and salt content are recorded for each specimen to test the concentration as a tubuli function.

The research reported confirms the value of these two tests when confronted with a puzzling case of albumin or formed elements or chondroitin in the urine, with nothing else to suggest nephritis. Repetition of the tests will usually throw light on the most puzzling cases, as the choice of a trade or profession or acceptance for life insurance cannot wait for time to clear up the case by the ultimate outcome. Pollitzer's test was also given a thorough trial and found not practicable. The findings with it demonstrated, however, the importance of extrarenal factors in the diuresis. The kidney functioning cannot be estimated apart from the organism as a whole.—Abst. in Jour. Am. Med. Assn. from Nederl. Tijdsch. v. Geneeskunde, Dec. 7, 1918.

Encephalitis Lethargica.

An awakening of interest is apparent in the obscure condition to which the name of encephalitis lethargica has been given and which occurred in England in an epidemic form last year. A very full discussion of this subject took place at a joint meeting of the Sections of Medicine, of Pathology, and of Epidemiology of the Royal Society of Medicine on October 22 last. From *The Lancet* report of this discussion we take the passages which seem likely to interest our readers.

DESCRIPTION OF THE DISEASE.

Dr. A. S. MacNalty described the condition of encephalitis lethargica occurring in the recent outbreak as an acute illness in which nervous localizing signs might or might not be present. There were three types: 1—A type displaying general disturbances of the functions of the central nervous system, but without localizing signs. 2—Types with nervous localizing signs: (*a*) clinical affection of the third pair of cranial nerves; (*b*) affections of the brain stem and bulb, with local lesions of other cranial nerves; (*c*) affections of the long tracts—e. g., pyramidal, prepyramidal, and upcoming afferent tracts; (*d*) ataxic types (involvement of cerebellar mechanism); (*e*) affections of the cerebral cortex; (*f*) types indicating some evidence of spinal cord involvement; (*g*) polyneuritic type. 3—Mild or abortive types, with or without localizing signs in the central nervous system. The *incubation period* was probably variable. The *prodromal period* commonly ranged from the first to the seventh day, but might be as protracted as three weeks, during which occurred lethargy, headache, giddiness, and diplopia, as well as lassitude, fatigue, vomiting, and diarrhea. *The acute manifestation* included slight early rise of temperature (to 101° or 102° F.), marked asthenia, catalepsy, stupor (alternating with nocturnal delirium), emotional changes, changes in speech (which became either nasal, monotonous and slurred, or chattering, rapid, and unintelligible), fibrillary movements, and choreic movements of face, trunk, and limbs. Muscular pains, hyperesthesia, retention or incontinence of urine, incontinence of feces, sweating, skin eruptions, and dysphagia might also occur.

Marked constipation was the rule. The rapid, complete, or partial clearing of the paralysis was the most remarkable feature of the types with nervous manifestations. Mild or abortive types were rare. Recovery was gradual and tedious, chiefly on account of the great prostration and muscular weakness. Death appeared to be due to paralysis of the respiratory center in the medulla, and was preceded by intensification and frequency of delirious attacks, deepening of the stupor, and coma. After-effects noted were: 1, alteration in the mental condition; 2, persistence of cranial nerve palsies; 3, the subsequent appearance of paralysis, apparently of spinal origin; and 4, athetosis. He concluded that, though the disease resembled poliomyelitis, it differed from it in important respects and displayed characteristic symptoms. It was possible that the accepted classification of poliomyelitis had been made on too wide a basis, and certain cerebral, ponto-bulbar, and ataxic types might have been examples of the clinical forms observed in this outbreak. Cases of poliomyelitis and encephalitis had been known to occur side by side. He thought the relationship between them might be comparable to that existing between typhoid fever and paratyphoid.

REPORT OF LOCAL GOVERNMENT BOARD.

Lieutenant-Colonel S. P. James (Local Government Board) said that Sir Arthur Newsholme had authorized him to give a brief summary of the results of an inquiry into encephalitis lethargica recently carried out by the medical staff of the Local Government Board in collaboration with the Medical Research Committee. Owing to printing difficulties the issue of the report of this inquiry had been greatly delayed. The summary he gave was abbreviated from Sir Arthur Newsholme's general review which prefaced the report. In its initial stages last April the inquiry was concerned chiefly with an investigation of the hypothesis that the illness was a manifestation of botulism. In connection with that view Dr. J. McIntosh, on behalf of the Medical Research Committee, carried out a complete bacteriological investigation, and Dr. G. C. Hancock and Dr. Pearse, of the Food Branch of the Board's Medical Department, personally investigated, from the point of view of a possible food origin, 58 cases reported up to May 7. The result of these preliminary inquiries was that neither on the bacteriological nor on the epidemiological side could any direct or indirect evidence be obtained of an association of the illness with the *Bacillus botulinus* or with infection from food. In addition to proving that the illness was not due to food, the results of the preliminary inquiry pointed to a possibility that it might be one of the many forms of the disease, or group of diseases, to which nosologists at present attach the indiscriminative label, "Heine-Medin'sche Krankheit," of which infantile paralysis—officially termed acute poliomyelitis—was the commonest type of illness. It was found, however, that from infantile paralysis the present illness differed very strikingly, not only in the localization of the paralysis and some other equally obvious signs, but in its age incidence, seasonal prevalence, course, duration, and fatality.

In these circumstances it was decided to carry out a more complete clinical and epidemiological study of the illness than had been attempted in regard to the first 58 cases. The Public Health Department of the London City Council agreed to investigate all cases in the London area. Up to the end of June the number of cases in the London area inquired into was 107 and the number in the provinces was 121. Apart from these special inquiries, Dr. A. S. McNalty was deputed to undertake a detailed personal study of the clinical symptoms of the illness, conferring with Sir William Osler, regius professor of medicine, University of Oxford, and with Major George Draper, of the United States Army Medical Corps, who examined and reported on cases in Birmingham, Leicester, Oxford, and other localities. On the bacteriological side, in addition to the research in connection with a possible food origin, the problem of the

nature of the illness was attacked from the point of view that the virus might be closely allied to, or perhaps identical with, that of acute poliomyelitis; and in this line of research animal experiments were begun as soon as the necessary monkeys could be obtained. In addition, Sir Walter Fletcher, F.R.S., secretary to the Medical Research Committee, secured the services of Professor G. Marinesco, of Bucharest, for the examination of specimens from fatal cases of the disease.

RESULTS OF INVESTIGATION.

The accounts given by all these observers might be summarized very briefly as follows: 1—For identification and description it was decided to follow von Economo in terming the illness encephalitis lethargica, a name which had the right of priority and indicated a characteristic clinical feature. 2—Dr. McNalty, from his clinical study, concluded (a) that in its essential primary features the illness had a characteristic and constant symptom of its own; (b) that between this symptom series and that of the rare forms of poliomyelitis with which alone it could be confused the clinical differences were more marked than the resemblances. 3—The results of the epidemiological inquiries were to the effect that encephalitis lethargica was not a form of acute poliomyelitis, and that its presence and epidemic prevalence depended on conditions other than those necessary for the presence and epidemic prevalence of that disease. 4—Both Professor Marinesco and Dr. McIntosh, as a result of their separate researches, arrived independently at the conclusion that encephalitis lethargica, as it appeared in the present outbreak, was identical with the illness described by von Economo in Austria and Professor Netter in France, and that it was a disease sui generis anatomically and clinically distinct from analogous affections.

It still remained to ascertain what the nature of the disease was rather than what it was not. Various hypotheses had been suggested by different workers engaged in the inquiry, but the views which appeared best to agree with present knowledge was that encephalitis lethargica was one of a group of diseases in which, as in cerebrospinal fever and acute poliomyelitis, the pathogenic agent was much more generally present in the human organism than the clinical evidence implied. As regards cerebrospinal fever, this was no longer a hypothesis, but a well-established observation. In that condition the specific reaction named cerebrospinal fever arose in one or other of two ways: first, as the result of a breakdown in the immunity to the effects of the virus which the individual who harbored it had up to that time enjoyed; second, as the result of a nonimmune person becoming infected with a strain of the virus which had attained the degree of pathogenic action described as specific. During severe epidemics evidence could sometimes be obtained that cases of cerebrospinal fever arose in both these ways, but during interepidmic and mild epidemic periods it was seldom or never possible to obtain evidence that the illness was infectious, as at such times cases of the disease were always scattered sporadically, and, except the patient himself, they cannot be traced to any known source of infection.

This was the view that best explained the irregular, widespread, sporadic distribution of encephalitis lethargica. Until further research yielded precise information we might assume that many people harbored the organism of the illness—perhaps as a harmless saprophyte, perhaps as a "conditional parasite," perhaps in the stage when it must be termed a "specific pathogenic" parasite —and that in certain of these persons there occurred for some unknown reason either an enhanced virulence of the parasite or a lowered resistance of the tissue cells, or both, the result being that the stimulus of the parasite overcame the resistance of the tissue cells and the host suffered from the effects of the virus which previously he had harbored with impunity. This explanation im-

plied that the key to the problem rested not in the purely bacteriological view
of the causation of disease, but in the wider view that disease resulted from
the interaction of several factors, of which changes in the properties of the
tissue cells on the one hand, and in the provoking stimulus or pathogenic agent
on the other, were the chief. The view emphasized the role of the individual
in the origin and progress of the disease, and the practical indication would
seem to be to enlist all the resources of personal and public hygiene in an
endeavor to influence favorably the potential energies of body and tissue cell
resistance, especially in individuals who might seem to be predisposed to a
disease of this nature if they happened to become a host of its parasite. At
the same time, it was clearly of importance to pursue research, both to ascertain
what pathogenic agent was concerned and into the factors of individual pre-
disposition and correlated resistance, the variations of which were subject
to so many influences. The first necessity for these studies was early and
complete information of all cases of the disease in different parts of the coun-
try, and for this reason the Local Government Board had decided, as a tem-
porary measure, to make encephalitis lethargica compulsorily notifiable for a
period of one year.

Colonel James then reviewed briefly the relevant epidemiological data col-
lected up to the end of June, and thought that the evidence adduced, in both
quantity and kind, supported the conclusions (1) that the illness under con-
sideration was not a form of acute poliomyelitis, (2) that its presence and its
prevalence in epidemic form depended on conditions other than those necessary
for the presence and epidemic prevalence of that disase. He displayed charts
comparing the seasonal incidence of poliomyelitis and encephalitis lethargica
and maps comparing the distribution of the two diseases.

EPIDEMIOLOGY.

Dr. W. H. Hamer pointed out that, just as in 1915, the socalled epidemic
of cerebrospinal fever was really only a small part of an influenza prevalence;
so in the epidemic encephalitis of the spring of 1918 a particular cluster of
symptoms was once more being singled out for scrutiny, and that here, again,
the epidemic, so-called, was merely part and parcel of a prevalence of influenza.
During the last ten years evidence had been collected, however, clearly showing
a close association between outbreaks of poliomyelitis, polioencephalitis, cerebro-
spinal meningitis, and prevalences of influenza. He referred to Brorström's
demonstration of the influenzal nature of poliomyelitis, to the London evidence
relating to the common origin of cases of influenza and of cerebrospinal fever,
and to the similar conclusions arrived at by an army bacteriologist from study
of the 1915 outbreak in camps. The proof that epidemic lethargy was no new
disease was writ large in Hecker and in Creighton, and was now being followed
out in detail by Dr. Crookshank in his Chadwick lectures in course of being
delivered. In spite of all this there was a disposition, in some quarters at the
present time, to claim that the epidemiological teaching must be brushed on
one side, and reliance placed exclusively on niceties of laboratory technic.
In view of the fact that "Spanish influenza" had followed hard on the heels
of epidemic encephalitis, he ventured to plead, once again, for the epidemio-
logical point of view. These "new diseases" could not be completely understood
by making cell counts and cultivating various strains of organisms; nor fully
comprehended by insisting on the fact that particular structures had been
picked out in the cerebrospinal nervous system, and that the lesions were
here at one level and there at another; nor satisfactorily explained by focusing
attention on some particular sign or symptom, whether it were sweat, lethargy,
paralysis, an exanthem, or some evidence of involvement of the pulmonary,
nervous, or gastrointestinal systems, and by considering each phase of the
epidemic prevalence in relation thereto and studying it apart from all the
other phases. Recognition of the epidemiological point of view really implied,
he submitted, a return to Sydenham's method. Creighton had declared that
there was something more than accident in the association between epidemics
of influenza and epidemics of "ague." Study of the last-named showed clearly
that they were not, of course, outbreaks of malaria, but precisely those very
gastrointestinal, pulmonary, and nervous manifestations which we were now
beginning to realize actually constituted part and parcel of influenza preva-
lences.

BOOK REVIEWS.

SURGICAL TREATMENT. A Practical Treatise on the Therapy of Surgical Diseases for the Use of Practitioners and Students of Surgery. By James Peter Warbasse, M.D., Fellow of the American College of Surgeons, American Medical Association, American Academy of Medicine, New York Academy of Medicine; formerly Attending Surgeon to the Methodist Episcopal Hospital, Brooklyn, N. Y. In three volumes, with 2,400 illustrations. Volume I. Philadelphia and London: W. B. Saunders Company, 1918, $30 per set.

The author states that the work has been written in the interest of the surgical patient. With this fact in mind, he has not only the treatment, which is most successful in the hands of preeminent operators, but also that treatment which will prove efficient in the hands of those less skilled. He has also endeavored to inspire the reader with the spirit of originality, to teach him not only how to do, but to suggest to him new lines of action, to set him thinking on the problems of treatment from his own standpoint.

The first volume is very complete as far as it goes. A summary of the contents will illustrate its scope, which includes general principles of surgical treatment, asepsis and antisepsis, surgical materials—their preparation and sterilization, anesthesia and anesthetics, wounds and operations, inflammations, surgical fever and infections, fistulas and sinuses, nutritive disturbances, tumors, blood and blood vessels, lymphatic system, diseases of the bones, fracture, dislocations, diseases of joints, operations on bones and joints, muscles, tendons —fascial and bursæ, skin and its appendages, nerves, index of names and index of subjects.

The text is up to date, and contains very many useful formulas and many valuable points. The subject matter is profusely illustrated. The illustrations are all clear, and add markedly an intelligent understanding of the text. The sections on operations on the bones and joints is particularly useful, and describes and illustrates most of the accepted operations.

The first volume might well be on the shelf of all surgeons. It is of particular interest to the orthopedic surgeon. It covers a large field of interest to him, and contains many useful facts.

SURGERY IN WAR. By Alfred J. Hull, F.R.C.S., Lieutenant-Colonel Royal Army Medical Corps, Surgeon British Expeditionary Force, France, late Lecturer on Surgical Pathology, Royal Army Medical College, Milbank; and Surgeon Queen Alexandra Military Hospital. With a preface by Lieutenant-General T. H. J. C. Goodwin, C.B., C.M.G., D.S.O., Director-General Army Medical Service. Second edition. 24 pages, with 210 illustrations. Philadelphia: P. Blakiston's Son & Co., 1919, $5.

In the early days of 1917, when American participation in the war was an accomplished fact, those on whom the burden fell of planning the medical military program blessed Hull's "Surgery in War." A benediction may now be said on this the second edition.

The work is authoritative; it is in one volume; it represents the war surgical experience not only of Hull, but also of Miller, Browning, Petrie, Richards, Iwan, and Tracy. It is complete in scope, replete in detail, and yet withal in comfortable compass. More than this one could hardly say, save to add that, even though one's library be well stocked with the newer monographs on war surgery and the extensive systems (such as the Horizon Series), it still is not complete without this volume. Such a statement made with conviction,

rather than in the usual perfunctory book-review vein, may well stand in lieu of detailed critique. No purpose would be served in pointing out, even in constructive spirit, the inevitable slips that occur here and there. There are no glaring surgical errors and no surgical heresies.

The following topics are fully discussed: wound infection, wound treatment, the removal of foreign bodies, tetanus, anaerobic infection, gas gangrene, gunshot wounds of the head, injuries of the spine, injuries of the blood vessels, hemorrhage, transfusion, wounds of joints, chest, and abdomen; gunshot injuries of nerves, amputations, gunshot injuries of jaws and face, compound fractures, shock, trench feet, and later treatment of bone injuries.

THE UNGEARED MIND. By Robert Howland Chase, A.M., M.D., Physician-in-Chief, Friends Hospital (for Mental Diseases), Philadelphia; formerly Resident Physician, State Hospital, Norristown, Pa.; Member of the American Medico-Psychological Association; Member of the Philadelphia Neurological and Psychiatric Societies; author "General Paresis," "Mental Medicine and Nursing," and "History of Friends Hospital." Illustrated. Philadelphia: F. A. Davis Company, 1918, $2.75.

In the author's own words this book forms a collection of medical writings, semiscientific in character, shorn in a large degree of technical terms and phrases. It is one of the provinces of this work to point out the pitfalls in the common highways of life. The writer wishes to show how to avoid many errors which, unheeded, lead to ill health. But the greater part of the volume is filled with the interesting thoughts of a most versatile mind on any and every question pertaining to insanity. Chapters entitled, some questions relating to the insane, imagination—its beneficial and baneful sides, an alienist's table talk, sketches, ex libris, at the deviate club, etc., are brimful with interesting, acute, witty, critical, and useful reflections, mostly given in short editorial-like paragraphs, or even in mere epigrammatic form. We find in this volume discussions of the legal aspects of mental ability and the faculty of making a valid will, and, again of more strictly medical questions, such as delusions of the insane, aspects of feeling, antisms, abulia, etc.

A detailed description of the contents of this volume is impossible, but references made in the foregoing lines can leave no doubt that the medical man or lawyer, and indeed every educated layman, will find in this work much valuable information and acute stimulation for thought.

UNITED STATES ARMY X-RAY MANUAL. Authorized by the Surgeon-General of the Army. Prepared under the direction of the Division of Roentgenology. 219 illustrations. New York: Paul B. Hoeber, 1919, $4.

One of the most remarkable chapters descriptive of the medical activities incident to the war is the one detailing the development of the Division of Roentgenology. By a close-knit organization. resting on the combined enthusiasm and activity of selected physicists and roentgenologists, there was worked out an x-ray armamentarium that, for the present at least, represents the last word in technical efficiency, compactness, and reliability. The whole story is told with admirable completeness in the United States Army X-Ray Manual. The volume is a model in book making, and reflects immeasurable credit on the authors, who, with delicate modesty, conceal their identity by fusing it with "the Division of Roentgenology."

In seventeen chapters the following topics are discussed: x-ray physics, laboratory experiments, new apparatus, standard positions, dangers and protection, fluoroscopy, bones and joints, localization, sinuses and mastoids, teeth and maxillæ, thoracic viscera, urinary tract, gastrointestinal tract, measurement of the x-ray dose, and cutaneous x-ray therapy.

INTERSTATE MEDICAL JOURNAL

ORIGINAL ARTICLES

Contents on Page 3

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ORIGINAL ARTICLES

Contents on Page 3